THE BUILDER

A Journal for the Architect & Constructor

Vol. cxxxvi. JANUARY 11, 1929 No. 4484

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Published every Friday

THE BUILDER LIMITED

CATHERINE STREET AND YORK STREET, ALDWYCH, LONDON, W.C.2

Telephone: Temple Bar 6251-2

87TH YEAR

From a Drawing by Mr. A. C. Fare, A.R.I.B.A.

THE BUILDER

A JOURNAL FOR THE ARCHITECT AND CONSTRUCTOR

WITH WHICH IS INCORPORATED "THE BRITISH ARCHITECT."

VOL. CXXXVI. No. 4484. JANUARY 11, 1929.

1929

IN attempting to outline a retrospect and an intelligent anticipation of the future, it would be a foolish procedure to explain the many difficulties, and, as it were, erect an elaborate scaffolding and leave it standing. The difficulties are taken for granted, along with the truism that we all lay claim to detached views that seldom coincide.

Ten years have gone since the greatest war in history was fought. Experience had shown that inevitably there would be a bad time of deflation, high cost of living, and widespread unemployment. We asked ourselves how would the British people face these troubles after four years of war rigours? The reply might be that we have done well, bearing in mind the dangers that beset us as a nation. Nevertheless, the economic life of Britain is still passing through a critical phase in its existence. Progress has been tedious and tentative. When the initial impulse to make a new world had faded, we found we were not quite certain what a new world meant. Nor are we quite certain to-day, at least in the sense that we fully understand the implications. We can easily say that the war upset a hundred cherished beliefs on which most of our commercial fabric had been founded. This is indeed what we do say—perhaps more in the nature of an excuse than as a reason—but the doubt remains whether it is wise to assume that economic laws are upset because of our beliefs. It is certain that the war had a number of direct results. Markets which had existed in 1914 completely disappeared, or altered radically in their character. Currencies that were sound became elusive. But granted these changes, it is still not clear that the fundamental laws of political economy have altered or become obsolete.

We have therefore to chronicle another year of honest effort in industry to deal with management, distribution and wages—in short, everything that comes under the heading of efficiency. This is all to the good so long as industry resolutely faces the clear issue implied in lower costs of production. Upon this issue there are extreme differences of opinion which are stoutly held. No good is served by outlining these beyond pointing out that there is still no unanimity upon what is meant by a standard of living. It is part of the irony of things to-day that we have a higher wage basis, an unparalleled amount of unemployment, and a large number of people who have neither houses nor the means to pay for building them. In view of these anomalies we have the choice of believing that the standard of living is higher or lower, and the probability is that it is both.

Although the welfare of the building industry is ultimately bound up with the fortunes of industry generally, it can be urged reasonably that the housing shortage and uuusual building development in London and other cities has stood between the building industry and the full effects of the post-war industrial depression. This position has its dangers. It is generally agreed that the large country house mansion will be scarcer in the future, while the demand for the smaller type of house has increased. We say that the demand has increased, but we are not convinced that the desire to build houses is marked by any enthusiasm. Various social reasons might be advanced for this lack of enthusiasm, yet it would be shirking the issue to avoid recording the prevailing impression that house-building is suffering from the burden of high costs—that is, in relation to other things. Herein lies the danger. The tendency, as always in matters of cost, is to try to save money on materials, and *in the search for cheapness* the building trade is in danger of losing some of its traditional materials and craftsmanship. It is a complaint from several districts that local materials in use for generations are now too dear, and other and cheaper forms of construction are in general use. This is a tragedy, certainly for architecture, while to most of us the purely industrial point of view, centred more upon employment than upon the nature of the work, does not seem to some critics an adequate excuse for these further inroads upon traditional building craftsmanship.

This danger-point, they think, requires stressing, but an analogy from the motor industry may illustrate, perhaps, their meaning quickly. Motor cars have decreased enormously in price during recent years, yet it is generally accepted by most authorities on this subject that much better value can be obtained to-day quite apart from the continual stream of improvements and refinements in motor design. We need not press the analogy further, but we can appreciate the public desire to buy a small car and compel the State to build a small house. To dismiss this aspect of the problem as a social development and nothing more is to ignore certain reasonable, and we might say eternal, principles in commercial values.

It is not a surprise, therefore, that the outcry against ugliness increases from day to day. From almost every town and village comes the complaint against the steady onrush of mean houses and settlements, while the English language seems barely adequate to convey the general feeling of disgust. Fundamental mistakes in design are undoubtedly responsible for much of the ugliness, but, our critics say, "the ugliness of cheap and mean building is equally responsible, and that it is a natural economic development. The danger is that it may easily grow into a bad habit, fostered by changes in the social outlook, and remain with us long after the economic difficulty is removed. We have not proven our traditional materials to be inefficient: we have merely discarded them for something cheaper but less durable. The building industry would do well to bear this in mind, since it threatens to alter the whole fabric of domestic architecture at least. It has often been publicly stated that the industry was not in need of finding a market, and the implications were clear. On the other hand, it is seldom stated, as an excuse, that the better interests of the building trade were probably sacrificed when it was at once protected, but prohibited from a free market. In counting up the cost that much deserves to be said."

It will be a relief when we can discuss architecture and forget the problems of ways and means. Despite the many handicaps, architecture is virile. Looking back over a period of ten years we note certain changes in the methods of architectural expression. Going further, we might say that we see more attempts to achieve some definite expression, even if these expressions of the same subject vary considerably. In short, there seems to be not only a greater mastery over the main composition, but a greater flexibility and certainty in the handling of the language and medium. Searching for a reason we do not attach much importance to the influence or effects of the war. Poverty and necessity, we were told, would give birth to a lean, sane, rational architecture. As a form of discipline for the designer there is no doubt some truth in this statement, but it also includes, so it would seem, domestic architecture forced by economics into something that is noticeable in its meanness. Rather do we attribute what is best in architecture to be the fruits of sound scholarly education in the fundamental principles of architecture and the art of building. It might even be said to-day that architectural knowledge is on a higher level than the medium in which architecture is expressed. At first this might appear to be an anachronism or rank heresy: it is a truth nevertheless.

We believe that the process of time, or what has been termed "the inevitability of gradualness," is slowly bringing us nearer to solutions that at one time seemed impossible.

NOTES

1929.

FRANKLY to accept changes, setting our faces towards reality, and if necessary reconsidering our desires, is the act of the wise, and never more needed than to-day. There is nothing hinders the future so much as doubt of ourselves, and we should fear nothing so much as fear. We cannot with safety tread the old accustomed roads when so much has altered, so much needing re-statement, and if that re-statement is towards greater reality, we should not fear but welcome its liberation. Were it true—which it is not—that the discoveries of science, biology, psychology, the extension of archæology, had undermined old beliefs, leaving us without anchorage, and guided by nothing higher than man's unaided struggle with primitive instincts, we might indeed find it difficult to "greet the future with a cheer." But is it so? Are not the aspirations towards beauty, truth and goodness, the faith we owe to our fellowmen, the response to nobler impulses and beliefs, which hold the security of life's welfare in their grasp, still ours to follow? Who then should tell us that life remains unguided, unless we deny our belief in these things. It is the characteristic of true wisdom to know that the best has yet to be known, it being left to the unenlightened to know so much more than this. We may feel the inadequacy of much in our institutions, but as we must work through them, it is for us to re-shape them nearer to real needs. Let us be builders in more than the material sense, faithful to the realities of truth, beauty and goodness, and the endless new horizon which await unfolding through them. Let us "hitch our wagon to a star." Thus, and only thus, will the New Year now opening out prove, no less for the country than for architecture, building, and the arts generally, that the best is yet to come if we have faith to reach it.

Craftsmanship and Modern Building.

IT is no use wishing for things if the facts of life do not warrant them, for it is not ideals resting on no substantial basis, but realities with which we are concerned. And the present direction of building, the rapid construction of huge building blocks for commercial uses, compel us, says a correspondent, "to reconsider the place of fine craftsmanship in relation to them. Are these building developments of recent years, with the rapidity and method of construction, their uncertainty of any permanence, conducive to fine craftsmanship, or is it so different in its nature as to be too far away to be incorporated in them? The craftsman seeking to adapt himself to modern conditions, which have so much displaced him, may reject as out of date, and even tiresome, the old workshop practice, in which he took such close personal part as the actual craftsman. The organisation of his craft work may be planned on similar lines to the methods of modern building, but are the results the same or to be valued as was the more intimate work of his predecessors? We think the craftsman is deceiving himself in the hope of having it both ways. Not in this manner shall we carry on the methods that gave so much dignity and beauty to the old craftsmanship. For these gigantic building blocks do not include within their scope either the outlook or the time for such work. Nor is there the security of permanence in them that we associate with the finer craftsmanship. The talk of craft ideals in such a relation has, in fact, become quite unreal, and it may be that the craft ideal of most validity to day is where the artist is seen making his own independent contribution, and that for the recovery of that ideal of craftsmanship we must look to him rather than to those who entering the field of modern construction have organised their work to conform to its needs—with what results to craftsmanship we will not estimate here. It is in the labours of the former that we must hope to see the promotion of beauty, vision and treatment, and, as it extends its influence, the recapturing of its place in architecture as the flower of its construction."

Perthshire War Memorial. Restoration of St. John's Church, Perth: Detail, End of Choir Stall.
SIR ROBERT LORIMER, A.R.A., F.R.I.B.A., Architect.

The Function of the Architect.

ARCHITECTS should be grateful to the *Times* for its discerning article on January 21, on the position of the profession. Apropos of our remarks last week, as to the necessity of the architect being consulted in the early stages of building, whether it be bridges or houses, churches or commercial buildings, the *Times* says: "The mistake is in not calling in the architect soon enough, when he would have a chance to exercise his proper function, which is not that of sticking on ornament, but of introducing order and proportion into the very bones of the fabric. Architectural beauty is anything but skin deep. For the very reason that building has become largely construction, the initial collaboration of the architect is by so much the more important. Building in the old sense could be and often was modified as it went along, but a badly proportioned steel-frame skeleton persists to the end of the work. Much more than of old the architect has become primarily the planner."

The Expansion of Concrete.

THE expansion of concrete was illustrated in a striking way by Dr. Faber at the Institute on Monday night. He said that at the Sittingbourne concrete viaduct, which is 2,400 feet long, the viaduct was divided into 100 feet sections, with expansion joints between, and it was found that the gaps were about three-eighths of an inch less at 3 p.m. after exposure to a hot sun as compared with 3 a.m. on a cold night.

St. John's Church, Perth: Detail of Choir Stall.

The force of this expansion is enormous. At one stage in construction a granite pebble became wedged into the joint in the morning, and resisted the expansion, with the consequence that after midday a large piece of the bridge's deck was blown off with a loud report.

The Exhibition of Dutch Art. THERE has never been a more interesting winter Exhibition at the Royal Academy than that now on view illustrative of Dutch Art, 1450 to 1900. It would take much time and space to do justice to such a fine exhibition, which will probably for the first time give something like a fair idea of the capabilities of Dutch artists. Some beautiful silver and glass add much to the interest of the galleries. As the catalogue truly says, the collection of old Master drawings in the South Room is perhaps the most distinguished ever brought together, having, moreover, some of the fine old frames. We do not wonder that the public are flocking in large numbers to see this wonderful show.

The Ministry of Health Architect. MR. A. SCOTT, M.B.E., has been appointed to take the place of Dr. Raymond Unwin as Chief Architect at the Ministry of Health. Mr. Scott has had considerable experience of official life as a member of the Architects' Department at the Office of Works. Dr. Unwin has now passed from Whitehall to his new post as the chief expert to the Greater London Regional Town Planning Committee. During the last few days he and Mr. Thomas Adams, who was one of the possible candidates for the position have both pointed out to the general public that it is possible to maintain open spaces and to obtain revenue from these, by using them as recreation grounds and bathing pools for which payment is made.

R.I.B.A. Debates between Architects and Specialists. THE very interesting debate between the R.I.B.A. and the Institute of British Decorators which took place some time ago is to be followed by a debate on Wednesday, 23rd January, at 9, Conduit Street, London, W.1, on "The Relations between the Architect and the Decorator with a view to their closer co-operation." Mr. Godfrey Giles, President of the Incorporated Institute of British Decorators, will open the debate, and Mr. G. G. Wornum, F.R.I.B.A., will reply on behalf of the Architects. This debate will be the first of four which have been arranged to take place during January, February, March and April, the programme for which was given on page 6 of our last issue.

Plaster Work. THE Building Research Station at Garston, which works under the supervision of the Department of Scientific and Industrial Research, is receiving an increasing number of reports as to failures of plaster work. Investigations are already showing that "there is a condition of widespread confusion and uncertainty associated with the use of gypsum plasters in the building industry. There are actually no recognised specifications nor precise description extant that can be used in ordering material or as a basis for claim in respect of defective material supplied." Accordingly, Dr. Stradling, the Director of the Building Research Board, is strongly urging that there is a need for official

St. John's Church, Perth: Detail of Choir Stall.

specifications to be drawn up for common gypsum plastering materials and products. With a view to drawing up formal specifications, such as those which exist for Portland cement, the experts of the Building Research Station are surveying the whole field of gypsum plasters so as to obtain a basis of precise data upon which later the detailed study of commercial products can be based.

The London Building Acts.

A CORRESPONDENT writes :—"London's Buildings Acts are being closely scrutinised by architects at the present time, and various ways of driving a coach and horses through the provisions are being discovered. This is especially the case in relation to the height of buildings. Under the present Regulations two stories can be set in a roof of a high building, provided they are set back above the 80 feet line. But what is the definition of a story? One architectural friend of mine talks of designing a building with a church on the roof and making this ecclesiastical edifice rather like the cathedral at Beauvais, one single story 200 feet from floor to ceiling. This is, of course, at present a fantastic suggestion, but it indicates the direction in which the minds of some architects are moving, as they find themselves restricted on all sides by building regulations, some of which are certainly out of date at the present time."

"The Whole Secret."

AT a recent inspection by the members of a District Committee, of some newly-erected houses, some interesting details were reported. It was recognised (we read) that improvements could be made from an artistic point of view, but that meant an increased cost, and a higher rental. It was claimed that the new houses were as cheap as any of their size built in Scotland. At the subsequent tea-party, a councillor contended that the "whole secret" of the cheap cost lay in the fact that the sanitary inspector had done the architectural work. (The quotation marks are not ours.) We do not read that, in receiving these congratulations, the sanitary inspector disclaimed any particular architectural knowledge.

St. John's Church, Perth: Seat and Stool.

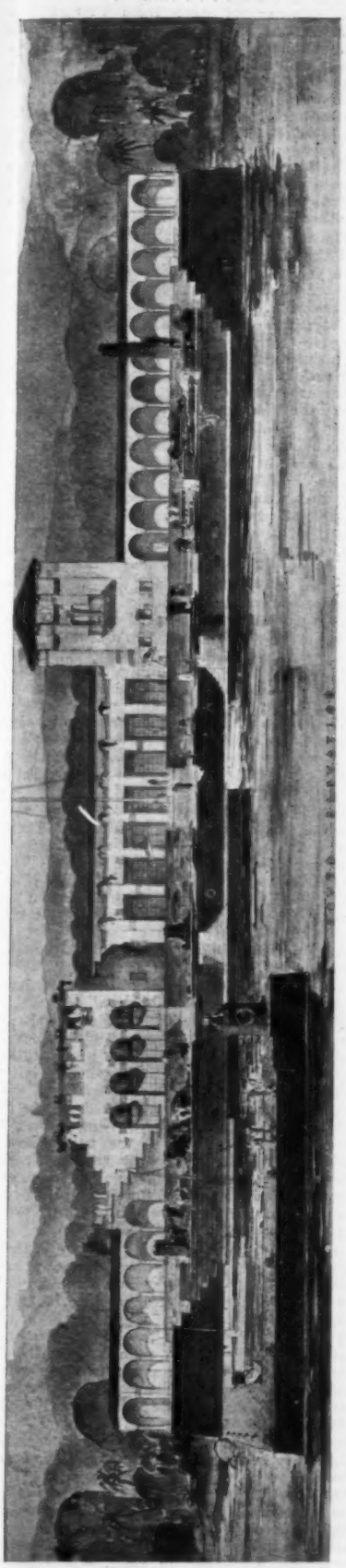
The Gifted Amateur.

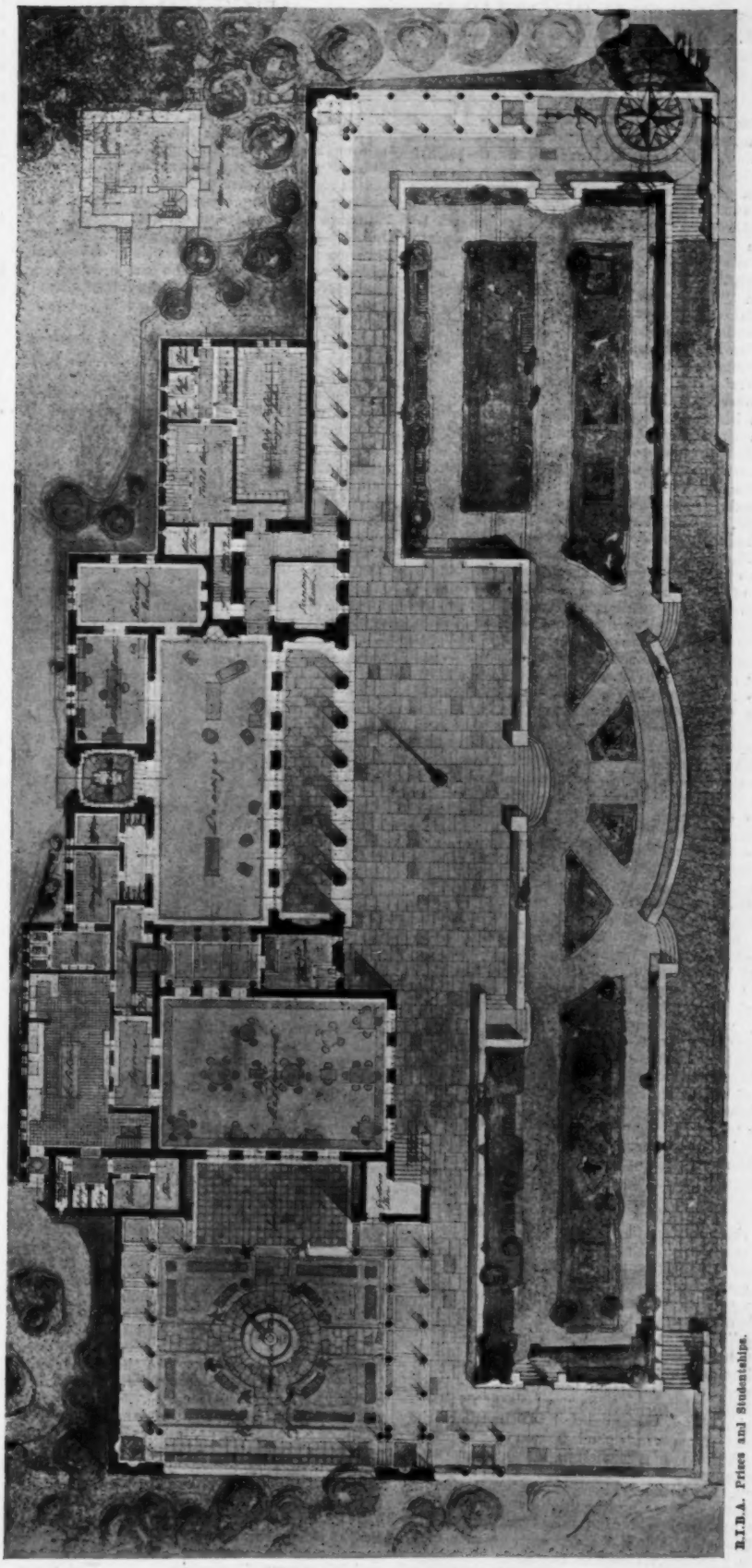
IN the above, we have an excellent example of the direct method of creating ugly conditions with, we might say, the best intentions. What passes for commonsense is thoroughly mixed up with economics for the purpose, if not of justifying ugliness, at least of explaining it away. As a nation, we are prone to confuse cause and effect in ugliness, probably for the reason that the authorship of ugliness is mostly anonymous. It is only when congratulations are being showered that we discover the gifted sanitary inspector, and can measure public opinion pleased with its parochial outlook.

"Ashley Chase," near Abbotsbury, Dorset.
Mr. E. GUY DAWBER, A.R.A., P.P.R.I.B.A., Architect.

Acoustics in Cinemas.

THE recent introduction of "talking" and "sound-effect" pictures to the cinema world provides a further problem not only for those architects who are engaged in cinema-design, but for those who are called upon to adapt existing buildings—in which generally no special provision has been made for acoustics—to present needs. Such architects will find of particular value the report of a lecture by Professor F. R. Watson, of Illinois University, U.S.A., on "The Acoustics of Motion Picture Theatres," in the current "Cinemas" issue of *Architecture*. The subject here is fully and non-technically explained. The issue in addition contains illustrations and, in many cases, plans of seven important and recent cinemas. Amongst these are the new atmospheric "Lido" Cinema, at Golders Green; the "Davis" Theatre, Croydon; the "Robin Hood," at Birmingham, and the "Plaza" Cinema, Liverpool.





The Tite Prize. "A Private Yacht Club on the Mediterranean": Winning Design.

By MR. WM. CRABTREE (Liverpool University School of Architecture).

R.I.B.A. Prizes and Studentships.

ARCHITECTURE AS STRUCTURAL GEOMETRY

By W. R. LETHABY.

THE older I get, the more difficult I perceive it is to pass thoughts from one mind to another. The process involves so much in regard to the understanding of words at any given period and our powers of apprehension and sympathy. What, for instance, does such a little word as Art really mean, and what have the words architecture and geometry meant at various times? To attempt to find out what is now meant by the word "art," we should have to read half a dozen contradictory books on æsthetics; or we could try to analyse what the art reviewers in the Press mean by it in their wonderful accounts of the wares in exhibitions and dealers' shops. On the other hand, we should discover in old indentures of apprenticeship such blunt equations as "the art or trade" of a tinker or a tailor. In Bailey's fine old English Dictionary of 1766, the simple and understandable definitions given of art and artists are these:—*Art*, "All that is performed by the Wit and Industry of Man." *Artist*, "A master of any art, an ingenious workman." *Artificer*, "A handicraftsman; an Artist, one who possesses some Art or Trade." The explanation given by Johnson is longer but of a similar kind. In Skeat, the definition of art is, "Skill, contrivance, method." The roots of the word are in the ideas skilful and well-fitted as in articulation.

Now, of the grand word Architecture, what does it really mean? It would need two fat volumes to try to explain, and then would arise the difficulty of passing on thoughts from mind to mind. When all was said and done, we should only accept the results according to whether we were of the high priestly caste of professionals who know the true doctrines because we do, or whether we were only plain-minded people without this illumination.

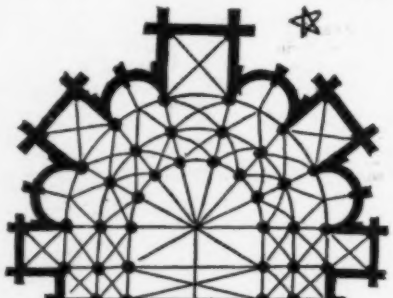
I have considered that I might gain some historical sidelight on the question by trying to find out what mediæval builders thought of their work. This led me to see that they said nothing at all of æsthetic architecture, but much of craft, science, and what they called geometry. What was this geometry? First let us turn to Villars de Honnecourt, a great practising French mason in the middle of the thirteenth century, who has left a MS. work on his art. It contains plans, towers, windows, drawings of men and animals, schemes of carpentry, mechanisms, constructive dodges. Several folios are devoted to geometrical working methods, such as how to set out an arch on a confined space; how to get the diameter of a column only part of which is showing; how to compute the measure of distant objects. He notes of these: "*Totes ces figures sunt estraites de geometrie.*" He begins by asking for prayers. "For in this book will be found good advice for the great power of masonry and of engines of carpentry. You will find likewise the power of portraiture and drawing as the art of geometry teacheth." He gives the plan of a square vaulted Hall, or Chapter House, and notes against it "*S'est le machonerie bone*" (this is good masonry). Of another plan he writes: "This is a presbytery which Villars de Honnecourt and Pierre de Corbie invented in a discussion together" (see illustration). Here we have the content of mediæval architecture expressed and implied: the power of masonry—good masonry; the power of the art of geometry; association with mechanics (engines); common effort; experiment, invention. There is no affectation of mystery, no riding the high-art horse; it is the practical talk of a mighty workman.

The star which I have put on the plan occurs so many times as the basis of designs that it must have had some special significance to the master. Was it his masons' mark?

The scheme for the end of a cathedral just mentioned is of interest in many ways. As a solution in planning; in suggesting, as other sketches do, that the contriving of a *chevet* was the great master problem of the French masons; in raising questions as to how the "dispute between them" was carried on. One must have stated a general notion or made a sketch, and the other suggested amendments. A game of the sort in architectural schools would lift minds for a while from the contemplation of the styles and the processes of rendering.

Next let us examine the fifteenth-century English book on Masonry (MS. add. 23, 198) in the British Museum, which was edited by Matthew Cooke in 1861. This printed version was addressed to "Freemasons," and so, I suppose, this very valuable book has never reached a wide audience.

"Jabal he was the first man that ever *found geometry and masonry*, and he made houses and is named in the Bible father of men dwelling in tents, that is dwelling in houses. And he was Cain's *master mason*, and governor of all his works when he made the city of Enoch, that was the first city that ever was made, and called it Enoch. And there was the *science of geometry and masonry* (sciens of gemetry and masonri) first



occupied and contrived for a *science* and for a *craft*, and so we may say it was *the cause and foundation of all crafts and sciences.* . . . Nimrod began the tower of Babylon and he taught to his workmen the *craft of measures*, and he had with him many masons, more than 40 thousand, and he loved and cherished them well. . . . Euclid was one of the first founders of *geometry*, and he gave it that name for in his time there was a water in the land of Egypt that is called Nile and it flowed far into the land. Then this worthy clerk, Euclid, taught them to make great walls and ditches to hold out the water; and he by *geometry* measured the land, and departed it in divers parts, and made every man to close his own part with walls and ditches. . . . And they took their sons to Euclid and he taught them *the craft of masonry, and gave it the name of geometry* because of the parting of the ground that he had taught to the people, in the time of the making of the walls and ditches to close out the water, and Isodore said in his *Etymologies*, that Euclid calleth the craft *geometry*. . . . And so they wrought with lords of the land and made them cities and towns, castles and temples, and lords' palaces. . . . And at the making of the temple in Solomon's time the King's son of Tyre was his *master mason*. And Solomon confirmed the charges that David had given to *masons*, and Solomon himself taught them their manners. And from thence the worthy *science* was brought into France and into many other regions. . . . There was a worthy king in France called Carolus Secundus and this Charles was a mason before he was king. . . . And St. Alban loved well masons and gave them charges and manners first in England. And after him was a worthy king called Athelstan [note *stan*], and his youngest son loved well *the science of geometry* and he wist well that *hand-craft had the practice* (*practyke*) *of the science of geometry* wherefore he learned the *practice of that science* to his speculative, for *of speculative he was a master*, and he well loved *masonry and masons*, and he became a mason himself and gave them charges and names as it is now used in England and in other countries" . . .

The italics in these extracts are mine. I find that my suggestion about Athelstan has been forestalled by Professor Coulton in a chapter on Freemasons in his *Art and the Reformation*. He points out similar thinking in regard to Charles the Second—Charles *Martel*—in the hammer of his name. Two centuries earlier than our book, the masons of Paris claimed privileges by gift of Charles Martel. He dates our MS. *c.* 1425. A second account of Masonry in verse has been published by Halliwell.

All this, with the implications thereof, tells us clearly what masons thought of their craft. As we should now put it: The art of building arose in practical needs. A great theoretical advance was made by Euclid, and from that time geometry and masonry almost became convertible terms. Geometry is the cause and foundation of all crafts. The theories of geometry form the speculative basis of the science or craft of masonry; and building or architecture itself is the practice of the same. Then the form in which it is put is delightful, dignified and heartening: I wish we had some such shorter catechism of the building craft—and, mercifully, not a word about Architecture, or style, or æsthetics; no nonsense whatever! No wonder that art was everywhere with everyone. We, on the other way, have made it so precious and high priestly that there is precious little of it.

During the Middle Ages geometry was counted one of the Seven Liberal Arts. These arts must be understood in the ancient sense: grammar and arithmetic were others. The scheme is found in Isidorus of Seville (570-636), who is cited in the masons' book; he knew both Euclid and Vitruvius. "At the end of the twelfth century [says Viollet le Duc] representations of the Liberal Arts occupied an important position in the great cathedrals. At this epoch the study of ancient philosophy was in great honour."

For the close association which we have seen existed between masonry and geometry, and in the enthusiasm for the latter, there was some deep cause. The forces underlying the energy and expansion of mediæval art have not yet been fully apprehended: one of these great causes was the absorption by the West, from the eighth to the twelfth centuries, of Arabic science, or rather, Greek sciences preserved and fostered in Saracen schools. Scientific mathematics and astronomy came as a new light and liberation. (See Singer, *From Magic to Science.*)

A thought that we should get clear is that oriental influence on the development of art was no accidental and sporadic copying of art forms, resulting, as we used to be told, from the Crusades; it was part of the great movement of the time—the absorption of the learning of the Saracen schools. One chief element was a new enthusiasm for the mathematical sciences. William of Malmesbury tells how Gerbert (Pope Sylvester II, 999-1003), "born in Gaul, fled by night into Spain, chiefly designing to learn astrology and other sciences of that description from the Saracens. . . . There he acquired whatever, hurtful or salutary, human curiosity has discovered. . . . The lawful sciences of arithmetic and astronomy, music and geometry he imbibed thoroughly, and with great perseverance revived in Gaul, where for a long time they had been wholly obsolete. Being certainly the first who seized on the

abacus [calculating board] from the Saracens, he gave rules which are hardly understood even by laborious computers. Gerbert, returning to Gaul, became a professor in the schools. Robert, son of Hugh surnamed Capet, afterwards King of France, appointed him Archbishop of Rheims. In that church are extant, as proofs of his science, a clock constructed on mechanical principles and a hydraulic organ." Among his works he wrote a treatise on computation called the Rules of the Abacus. He is said to have first conceived the idea of the Crusades. The papacy of Sylvester and the year 1000 may be taken as the turning point towards the arts of the Middle Ages.

A great Englishman, Adelard of Bath, born *c.* 1100, made a contribution to this enlightenment. He travelled in Spain, North Africa and Greece, and translated Euclid's geometry. "This translation was made from an Arab version or from the original . . . the former supposition seems the more satisfactory. On his return, Adelard threw into systematic shape such of the Arab teachings as he had acquired." His works included treatises on the Abacus (computation) and the Astrolabe (astronomy). He called the Liberal Arts the Seven Wise Virgins. The new excitement for learning found in Grosteste, Bishop of Lincoln (1175-1253), and Roger Bacon (*c.* 1214-1294), was nourished from the same Saracen sources "with such aid as was afforded by the increasing knowledge of the Arabic writers in Paris." Expanding mediæval art not only made use of the new science, but it was excited by the general enthusiasm of the time. Up to the age of St. Louis, a consciously orientalising strain may be discerned in French Gothic art. One striking evidence of this is the imitation of Cufic writing in ornamentation. As late as Chaucer's time, memory was preserved of Saracen learning, as may be seen from his treatise on the Astrolabe.

In Arabic art itself there is a very powerful geometrical element, which I have little doubt came of some deep ancient star-gazing tradition. Arabic art seems naturally to run into star forms, radiating and intersecting lines, protractions. In the new *enthusiasm* for geometry in the West I see a chief force in the development of Gothic architecture. This new ferment worked on northern minds saturated with the mystery of the forests. The outcome was Gothic art.

In the more philosophical general reflections scattered in his great Dictionary, Viollet le Duc expresses ideas and makes observations with which we are hardly sufficiently familiar. To us "Gothic" has so much been a question of shapes that may be copied and names that can be given, "Lancet and then Decorated and Perpendicular" sort of thing, all by rote. Speaking of Descriptive Geometry, he writes (s.v. *trait*). "Near the period of the first Crusades one perceives a notable development in the knowledge of it in France. At the end of the twelfth century the masters of the works regained possession of geometry, and their ability in the science increased year by year until the end of the fifteenth century. The practice of descriptive geometry was developed among oriental peoples. After the translation of the Empire to Byzantium, important schools of mathematical science were formed at Constantinople, Alexandria, and Baghdad, and in the countries ruled by the Caliphs. The Crusaders found such schools in Syria, and from the twelfth century the art of projecting solids and developing surfaces was practised in the West." This whole article is illuminating. He points out also that it is significant that practically all representations of mediæval masters show them with big setting-out compasses in their hands.

Gothic architecture was the vital integration of many elements. These were the expanding energies of the folk at a given time; the deep background of mind which produced also the forest romances and caused the building development to take a certain direction; then there were all the inheritances, and circumstances of the time, including oriental contacts and absorption of the sciences and philosophy of the Arab schools. Our critical appreciation of "Gothic" has hardly amounted to more than this—"It was a style and they did it, or at least it was a style when they had done it, you know, and it altered going along, because, why because it did, and it was like that, and if we do it like that, then it will be like that, too." Is not this really as near as we usually get to any theory of modern Gothic or revived Renaissance? This way of putting it plainly may look like irony, but what other excuse is there for our earnestness in the sham styles? Real schools of architecture have deep motives and living, expanding principles. Gothic architecture was the way of building developed in north-west Europe under certain historical conditions. Taking for granted such conditions in place and time, I would describe it as an outcome of the forest heart, the geometric mind, and the mason's hand.

The word geometry is likely to suggest to modern people little more than axioms and propositions, and the drawing of problems, such as "To inscribe any polygon in a circle." We know there is solid geometry as well as plane, but that, and the extent of that, hardly rises spontaneously in the mind. Talk of geometry and architecture together is likely to suggest little more than compass-play on paper; but it was not so only a short while ago.

What was understood by Geometry in the Middle Ages is fully explained by later use up to quite modern times, when the category of mechanics was introduced and widely extended. Wren used the word geometry in the old sense. In a delightful book by Henry Peacham (1576-1643), *The Gentleman's Exercise*, published in 1635, I find a chapter in explanation and laudation of the science. It is entitled "Of Geometry," and from it a long quotation must be made. To us this is all the more interesting, as in another section he speaks of Inigo Jones, Surveyor of His Majesty's Works for Building, as one of two "especial and worthy friends." "Since Plato would not suffer any to enter his school who was not entered into Geometry I am also bound by the love I bear to the best Arts to give it you also. God did dispose of all his creatures according to measure, number and weight. To the consideration of which depth of wisdom let us use the help of this most ingenious and useful Art *worthy the contemplation and practice of the greatest Princes;* a Science of such importance that without it we can hardly eat our bread, lie in our beds, buy, sell or use any commerce whatsoever. The subject of geometry is the length, breadth, and height of all things, comprised under the figures of Triangles, Squares, Circles, and Magnitudes of all sorts with their terms or bounds. It hath properly the name from measuring the Earth; for when *Nilus* with his overflowing drowned and confounded the limits of their fields, certain of the inhabitants more ingenious than the rest, necessity compelling, found out the Rules of Geometry; by the benefit whereof every man had his own portion of ground lotted out to him: so from a few weak principles at first it grew to that height that it reached up to the Heavens. For by means hereof are found out the forms and draughts of all figures, greatness of all bodies, all manner of measures and weights, the cunning working of all tools; with all artificial instruments whatsoever. All Engines of War. . . . By the benefit of Geometry we have our goodly Ships, Bridges, Mills, and Coaches (which were invented in Hungary and there called *Cotzki*), Pulleys, and Cranes of all sorts. She also with her ingenious hand rears all curious Roofs and Arches, stately Theatres, Columns, pendant Galleries, Turrets, and first brought to light our Clocks and curious Watches, even the Wheelbarrow. . . ."

That has Elizabethan vitality still in it. That is the kind of thing—it may have been the very thing—which turned and tuned Wren's mind. That is the kind of enthusiasm we have to get back to our dead architecture. Some day constructive art will take the place of vague mutterings about styles and periods and other decadent modes of thought.

The mediæval way of thinking about geometry persisted almost to our own days. In Bayley's dictionary, quoted before, I find: "*Geometry*, originally the art of measuring the Earth; now it is used for the Science of Extension. *Speculative Geometry* treats of Magnitude, with its properties abstractedly considered without Relation to Material Beings."

"*Practical Geometry* is the method of applying *Speculative Geometry* to use and practice as Surveying, Dialling, Fortification, etc." This perfectly explains the meaning of "practyke" and "speculatyf" in the old Masons' Book. A tremendous accident in things human is the power of words in shaping thought, and somehow the modern word mechanics has not the depth and dignity of the old word Geometry.

It is Geometry, Structure, the art of Building, of which it is said: "She with her ingenious hand rears all curious Roofs and Arches. Yea moreover such is the infinite subtilty and immense depth of this admirable Art that it dares contend even with Nature herself."

It is evident that to mediæval masons *geometry* was an idea, a principle, an enthusiasm. Villars even applied it to schematic ways of drawing human figures in various positions. Vasari tells the story of how, two centuries later, one of the Italian painters became absorbed in the study of perspective and hardly ate or slept for thinking "How beautiful is this perspective." So the early masons were enraptured with this beautiful Geometry—in love with triangles. On the executive side Gothic architecture was a great scientific movement, an exploration and expansion of principles and powers. It became what Morris called organic.

It is more or less an accident that by combining the evidence from several sources I have been able to bring this out, but when once the written word is compared with the monuments the truth is self-evident. It would be a great thing, indeed it is simply necessary for our power as builders, to get back large and attractive ideas of "geometry"—of organic structural art. Full understanding of volumes, extensions, solids, balance, stability, rightness, science, law, desire for perfect articulation, and an idea of an expanding principle, must take the place of our concern with the little trivialities, and costly whimsies, now called Architectural design. This is necessary, I believe, to our very survival in civilisation—I must for once beg for attention to the seriousness of these problems. We cannot continue in make-believing too long without deep injury to the quality of our minds. Architecture certainly builds architects. At the present moment I can only discern three working theories: (1) Let us go on with the sham styles and say as little as possible about any principles: "let us eat, drink and be merry. . . ." (2) Baroque is a blessed sounding word which is being made much of in Germany and that would be something to copy. (3) Watch what is being done in Scandinavia and America and imitate the "style" of their results. We must have style to copy, for that is architectural design, and we have been taught that design is very important.

This lack of living art is a tremendous sociological problem; as the formation and expansion of a vital school of art like the Gothic was a wonderful human phenomenon.

Note.—Saracen objects and textiles were collected in Cathedral treasuries, and the word Saracen denoted foreign things generally. Villars drew what appears to be a Roman tomb but calls it Saracen. In England great boulder-stones are called sarcens.

J. L. PEARSON AND TRURO CATHEDRAL—I

By S. E. DYKES BOWER.

THE jubilee of the diocese of Cornwall, which has just been celebrated, is an event of considerable interest. It draws attention to an architectural masterpiece that has long been unduly neglected. Truro Cathedral was not merely the first English cathedral, with the exception of the rebuilding of St. Paul's, to be built since the Reformation. It was the greatest work of a particularly gifted architect and among the largest and most significant undertakings of nineteenth century art.

The provision of a cathedral church became a necessity when the ancient Cornish see, after 800 years' submersion in that of Exeter, was restored at Truro. Unlike Bodmin, whose claims to be the cathedral city enlisted many vigorous advocates, Truro possessed in St. Mary's no large and stately parish church. Built between 1500 and 1520 on the site of two earlier and successive churches, it consisted of a nave and south aisle of eight bays with a smaller north aisle of five bays. Its only notable feature was the exterior of the south aisle, a bold and vigorous design displaying a profusion of ornament similar to that at Launceston and Probus, but otherwise without parallel in Cornwall.

St. Mary's suffered the usual vicissitudes of the town church. When Truro in the eighteenth century became the fashionable winter resort of the neighbouring county families, it was adapted to conform to prevailing taste. The rude granite pillars were provided with strange plaster capitals carrying a full entablature, the old roof was encased in a barrel vault of plaster, and the single bell-cote at the west end was supplanted by a quasi-classic steeple with details in the Gothic manner. This the Corporation had erected at a cost of nine hundred pounds. In less than a hundred years fresh changes were called for. The miserable tower remained, but all else was swept away. The plaster was stripped off, the floor cleared of its box pews, the chancel equipped for a choir, and the sanctuary garnished with encaustic tiles and painted wall-arcading.

What could be done to fit this building for a more exalted status? Piers St. Aubyn had already produced a scheme for enlargement. He proposed to build on at the west end a nave and aisle of six bays with a lofty pinnacled western tower, the new nave rising well above the old with a rose window at its east end in the space of wall surmounting their junction. It was not, however, a good design. Apart from grave faults of composition, the rather insipid Decorated of the new work bore little relation to the old, and difficulties of site required a change of orientation that internally would have produced distortion of the most painful kind.

Benson, the first Bishop, had more ambitious projects. Coming from the Chancellorship of Lincoln, imbued with great ideals of what a cathedral should be, he was emphatically opposed to the magnification of existing parish churches. He determined that Truro should build a new cathedral and one that in nobility of conception should yield nothing to the achievements of the Middle Ages. No timidity of treatment was to brand it with the stigma of inferiority. Built on the mediæval principle, piece by piece, as money flowed in, its completion extending if necessary over a long period of years, it was to be a supreme opportunity for nineteenth-century art, in spirit to emulate the ages of faith, in practice to realise contemporary ideals and requirements.

A proposal so startling could hardly fail to incur a mixed reception. In some quarters it was hailed with enthusiasm. Though the day had gone by when an ability to distinguish between "early-late" and "late-early Middle Pointed" was almost the qualification of a gentleman, it was not long gone. There were many zealous and learned ecclesiologists left; and if the amateur mediævalist might no longer flourish, it was far otherwise with the architectural dilettante. He viewed every new church as an experiment of profound interest, and not a few were being built. A new cathedral was indeed cause for rejoicing.

Photo: Jordan, Truro.

The Cathedral from the South.

Photo: Jordan, Truro.

The Cathedral from the East.

In the architectural profession there was no lack of confidence. That, indeed, is not a disability under which the profession has often laboured, and just now its position seemed a peculiarly strong one. The battle of the styles had been fought and won. With the rout of the Classicists, Gothic secured full possession of the field. Its followers claimed many triumphs to their credit; it was reasonable to expect that many and greater would follow. If of late one or two of the younger men had shown a disposition to worship false gods, there was still no need to fear disruption. Architects were not even much worried by the strange doctrines of intellectuals; those who had learnt how to humour the caprices of that petulant child, the Camden Society, could surely afford to smile on the vagaries of a few eccentric enthusiasts.

Yet the position was not so secure as they imagined. Just when the Revival seemed most firmly established, most capable of good work and most ready to blossom forth into a new and vital tradition, the wind blew and it was scattered. Almost without warning and seemingly without reason, it suffered complete and ignominious extinction. This is not the place to discuss why it happened, but some attention may be drawn to the state of ordinary uninstructed lay opinion.

The period of ardent enthusiasm which characterised the years between the Great Exhibition and the opening of the Law Courts was beginning to die down. Ecstasy was bringing mortification in its train, over-confidence giving way to disillusionment. The inevitable reaction was setting in and the public, under the influence of criticism, some of it hostile, more of it captious, was beginning to open its eyes. As always it was not

to the good but to the bad that it was asked to turn its attention, to a spectacle of wild extravagances and ridiculous follies that could only be contemplated with dismay. The more enlightened began to realise that the Revival was foundering. The question was, Could anything be saved from the wreck? Was there no satisfaction in a conviction that at least the course had been right and only human fallibility to blame for disaster? Unfortunately such satisfaction was not easily attainable. The simple architectural faith of —as it now seemed—that golden age when Pugin was giving laws, had given way before the onslaughts of later, equally dogmatic seers. Extraneous issues, ethics, politics, economics had crept in and complicated matters; there was even the murmuring of voices, still and small, but exceedingly sinister, that seemed to impugn the very inviolability of Gothic. The ebbing tide was not yet due to turn, and the latter might perhaps be disregarded. But one fact stood out with depressing clearness—the architectural inferiority of the nineteenth century to even the least of those blest ages that could claim the title "Mediæval."

The idea sank deep and lasted long, and it is hardly surprising that its pessimism proved deadening. So long was it since cathedrals had been built that it now became accepted that the power to build them was extinct. It mattered little that two cathedrals—Scott's St. Mary's and Burges's St. Finbar's—were already a-building. Every one assumed they were small and insignificant, and places so distant as Edinburgh and Cork were viewed merely with disinterested detachment. A new cathedral, on a big scale, in an English diocese, was a very different matter. On the whole, lay opinion looked upon it with misgivings.

In Cornwall itself there were practical difficulties to face. The county was a poor one, and at this time impoverished by the decay of the tin-mining industry. Nonconformity was rampant and church life at a low ebb. Yet somehow the unexpected happened, and money flowed in so rapidly that the work of preparation was taken in hand at once.

The choice of architect lay between Street, Pearson, Bodley and Garner, Burges, Pullan, J. O. Scott and St. Aubyn. The latter had more connection with Cornwall than the others, but neither he nor Scott nor Pullan were strong candidates. No man's reputation stood higher than Street's; no man was encumbered with a more extensive practice. Bodley and Garner, as experts in the proprieties of internal church decoration, were unsurpassed. Burges was a combination of brilliance with eccentricity. Pearson, to whom the appointment was given, had perhaps the highest claim to all-round merit. His knowledge of Gothic was second to none, and an eminently minster-like quality in many of his works showed clearly that he was in sympathy with and understood the Cathedral ideal.

Photo: Jordan, Truro.

The Cathedral from the South-East, showing old St. Mary's Aisle.

Photo: Jordan, Truro.

The Cathedral from the West.

A right understanding of its author is essential to a right understanding of the Cathedral, and it may be well to say something of Pearson's nature and career. John Loughborough Pearson was born at Brussels in 1817 and spent his youth at Durham, where his father was an etcher and water-colour artist of repute. At the age of fourteen he became a pupil of a Durham architect, Ignatius Bonomi, the eldest surviving son of Joseph Bonomi the elder. Going later to London, he entered the office of Salvin, and then of Philip Hardwick, for whom he worked on the Hall and Library of Lincoln's Inn. Possibly most of the credit for those buildings is due to him. In 1843 he started practice on his own, his earliest works being a set of churches in Yorkshire, in the then customary Decorated. He attracted most notice, however, by his first London church, Holy Trinity, Bessborough Gardens, finished in 1852. The work of the following ten years was influenced by Continental, especially French, Gothic, and finds typical expression in the village church of Daylesford in Worcestershire. This period culminated in a famous London church, St. Peter's, Vauxhall, where for the first time he employed that system of brick vaulting which later became almost a hall-mark of his work. His style now underwent a change, and by 1870, when he designed St. Augustine's at Kilburn, it had become the very different but perfected and matured product that continued almost unchanged till his death. It was this that gave us the unique and beautiful series of churches which includes St. John's, Red Lion Square; St. Michael's, Croydon; St. Stephen's, Bournemouth, and, greatest of all, Truro Cathedral.

The architectural influences of his early surroundings probably played a large part in the formation of his style. If it is true that first impressions are usually the strongest, it is not surprising that his development took the course it did. His childhood was spent under the shadow of Durham's Nine Altars. Early acquaintance with Hexham and such neighbouring Yorkshire abbeys as Whitby and Rievaulx brought him into contact with the same school and period of Gothic. Doubtless it was not long before he discovered the choir of Beverly and the south transept of York. When, later, he looked further afield, it was only natural that he should have found in the great churches of Normandy and Brittany a sort of second spiritual home. They were able to supply just what England lacked to give him all he wanted for the working out of a complete and individual expression of Gothic.

Strongly personal as this expression was, it was uncompromising in its adherence to precedent. It did nothing to enlarge the Gothic vocabulary, and on this account, with the Gothic Revival as a whole, has had to endure much subsequent criticism. Most of this criticism is superficial and valueless through being based on intolerance of any but modern ways of thought. It is true, certainly, that nineteenth-century criticism was too largely permeated with the idea that anything for which chapter and verse could not be quoted was originality undesirable, and to the stricter spirits impious. But the idea was not really so widespread as is commonly supposed. It does not justify the equally absurd attitude of those who seem to think that originality consists only in that for which precedent can very definitely not be quoted, and so condemn Victorian Gothic as at best arid pedantry, at worst disreputable filching. Pearson was by no means the most original or independent artist of his time but he was very far from being a pedant. That his art should have been seasoned with scholarly reminiscence and suggestive allusion was the delightful privilege of one who had made his learning perfectly part of himself. That he was able to express himself fully and consistently within the limits of a well-defined style was indication not of a small, but rather of a trained imagination, a calm and accomplished mental temper as refreshing as it is uncommon.

Though he neither lectured nor wrote, and even shrank from any form of publicity, Pearson was one of the outstanding figures of the Victorian Gothic movement. The fact that a distinction fell to him that through three centuries had fallen to no one save Wren alone would have made him so. But there were better reasons. Born about the same time as the pioneers of the movement, Pugin, Scott, Carpenter, Butterfield and Street, he was enabled to see its

Photo: Jordan, Truro.

Clock Tower seen from Cathedral Lane.

rise almost from the beginning; and, dying in 1897 at the age of eighty, he lived to see its fall. He was thus in the movement all through. Yet he was not wholly of it; his development was distinctive. Susceptible at first to passing fashions, he nevertheless found himself comparatively early and struck out on a line of his own as few of his contemporaries succeeded in doing. The nearest parallel is to be found in the career of another great Gothicist, George Frederic Bodley, who, born ten years later, outlived Pearson by the same amount. He too, after an early experimental period, quickly formed a style of his own which by much practice he brought to an exquisite perfection. In themselves they were not dissimilar. Essentially moderate-minded men, they maintained a mental equilibrium through years of artistic ardour and intellectual turbulence that to-day seem almost incredible. Without the indefatigable versatility of Scott and Street or the passionate fanaticism of Burges and Butterfield, Pearson and Bodley were able to combine with a perfect belief in the superior claims of Gothic a wide-minded outlook on other styles. It is said that Pearson always hoped for a chance to do a purely classic building. What he was capable of in "Free Renaissance" may be seen in the Astor estate office on the Embankment. And Bodley, as early as 1879, produced in River House, Tite Street, Chelsea, one of the most charming things ever accomplished in "Dutch Classic."

The styles that Pearson and Bodley chose were entirely different in effect, but not in essence. Each was a rich, mature and highly refined style. Pearson went to the early part of the thirteenth century for his inspiration; Bodley favoured that of a hundred years later. The one was the finest Early English, the other the finest Decorated. Each lightened what he took with a leaven of later detail. Each, as far as he erred at all, erred in the direction of over-elaboration, a tendency to compress too much into a small space, especially in the excessive multiplication of mouldings. Pearson indeed was apt to overwork his plans, and some of his buildings, in consequence, look overcrowded. But, taken as a whole, their contributions to English architecture rank very high indeed. They are contributions of work catholic in the best sense, free from a trace of decadence; learned, cultured and humanised; "strong without rage, without o'erflowing full."

Pearson presented his plans in 1879, and in 1880 the foundation stone was laid. Work began on the choir and transepts, which were finished in 1887. The nave and central tower followed, and last of all the western spires, completed in 1910. Pearson died in 1897, and since then Mr. F. L. Pearson, his son, has had charge of the cathedral, continuing it, with small modifications, in accordance with his father's designs.

(To be continued.)

THE PRESIDENCY OF THE ROYAL ACADEMY.

By PROFESSOR A. E. RICHARDSON.

THE selection of a President of the Royal Academy raises issues external to the domestic affairs of that august institution. There appears to have been little expression of opinion as to the relative positions of the arts of architecture, painting and sculpture. There is still a tendency, which is mistaken, to stress the importance of painting, and to relegate architecture to a tertiary place. A little reflection will show how fallacious this latter theory is. The painters claim to portray the characteristics of a period; the sculptors set out to achieve symbolism in marble and bronze. But the architects, who, for the most part, are jacks of all trades, are the true historians of their own time. Not only does the greater burden of building fall upon their shoulders, but they provide the conventional scenery of the streets; they give opportunity to the sculptors, and, moreover, they influence all the subsidiary arts. We have, therefore, to discuss a general principle, not the relative merits of individual practitioners.

The issue can be narrowed down to the following: Does the Royal Academy fully represent the artistic direction of the nation? The Academy, which grew out of the Society of Artists in 1769, is an eighteenth century institution. The famous "Instrument" remains the basis of its organisation; and the original point of view is still adhered to. But the mass of artistic opinion to-day belongs to the beginning of the second half of the twentieth century. Even in the public estimation the art of architecture has attained to a fuller significance. It is, indeed, somewhat of a paradox that outside Academic circles the art of building now occupies the premier position in the public mind. It is the one essential art. The public can appreciate and enjoy it without charge to ordinary individuals. The temperament of the eighteenth century segregated the arts into three divisions, prominence being given to painting. So conservative is tradition that people have accepted this dictum, and painters and sculptors have come to believe that architects have no breadth of view outside their own activities. When the subject is examined from a reasonable angle it becomes clear that the arts conjointly need co-ordination.

In classical times and during the autonomous rulings of the Middle Ages the art of architecture was a dominant force. The magnificent expressions of the Renaissance, mainly buildings, provided a setting for painting and sculpture. It was not until the Renaissance had run its course in Western Europe that academies took the place of bodegas, and art began to suffer from post-mortem dissection.

In the case of England, the founding of the Royal Academy in the late eighteenth century was opportune. In its first cycle, from Reynolds to Lawrence, a definite policy was initiated. Then followed a century of eclectic experiment in all the divisions of the arts, each and several of which tended to drift apart. The Royal Academy to-day does not lead the nation in art matters, for the reason that it does not possess a leader representative of the leading art, *i.e.*, architecture. The painters can only view affairs from their own limited coign of vantage. We have yet to await the time when the Academicians will appreciate the country outside the House Beautiful.

The most vigorous of the arts to-day is that of architecture. Building is an essential and not a luxury art. It expresses the conditions of the moment far more forcibly than either painting or sculpture. It has moments of grandeur and it descends to the common level of the many social grades. Even the brilliant exponents of architecture do not realise the immense power at their command. The curious thing is that the driving force to produce fine architecture is in being, and also that the public desires good things. But the Royal Academy continues apathetic to the real issue. In other words, the Academy does not fulfil its purpose in securing the hegemony of art. Hence the preference given to portrait and landscape painting and toy-like sculpture. Within the House Beautiful architecture is relegated to the disconsolate position of Cinderella.

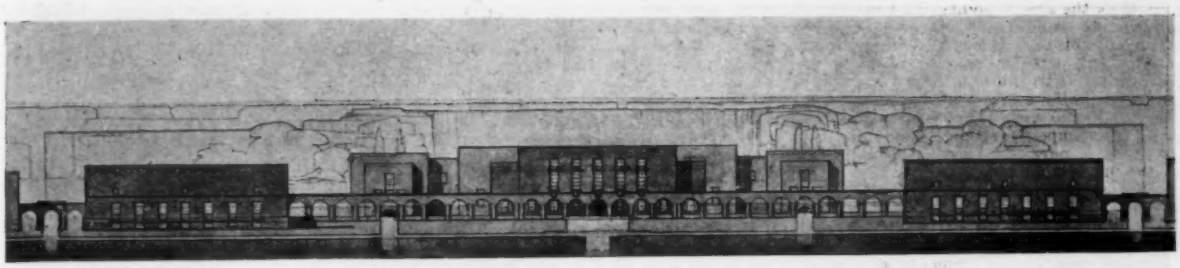
For such reasons those who entertain a broad view of national art deplore the election of a painter to the presidential office. They opine, and perhaps rightly, that at this juncture the election of a brilliant architect would have done much to restore public confidence in the destinies of the Royal Academy. When we examine the records of the Academy we are astonished to find the part played by architects in its organisation and sequential development. Sir William Chambers was instrumental in bringing the Academy into being. For many years he acted as treasurer. In point of fact, the office of treasurer has fallen to the lot of many architect academicians. The following list is illuminating, *i.e.*, Sir William Chambers, John Yenn, Sir Robert Smirke, Philip Hardwick, Sydney Smirke, Edmund Barry, George Edmund Street, Norman Shaw and Thomas Graham Jackson. The architects who have become presidents are few. In 1805 James Wyatt was elected president in succession to Benjamin West, but his nomination was never approved by the King. It was nearly a century before another architect, Sir Aston Webb, occupied the presidential chair. Almost invariably a painter has been elected, but not a sculptor.

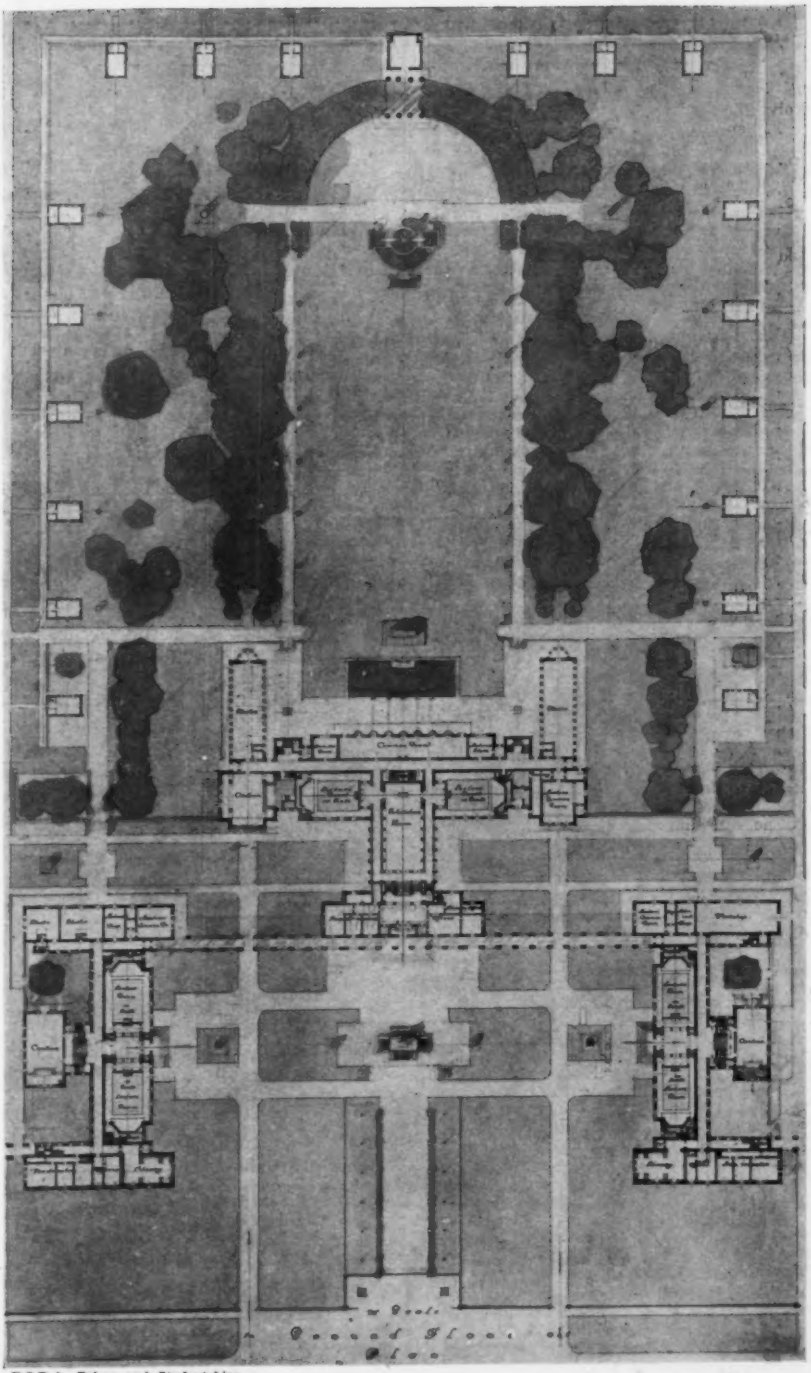
Previously I have endeavoured to show the arguments in favour of an architect president. An architect has it in his power to direct the works of others. He it is who provides themes for sculptors and internal wall space for painters. The architect to-day is the chief practitioner and patron of the arts. He is both deviser of structures and "ensemblier" of embellishments. Because supreme direction is lacking and because the members of the Royal Academy fail to appreciate team work, painting takes refuge in portraiture, and sculpture wastes its effort on meaningless groups.

When the Royal Academy was founded, and when Sir Joshua Reynolds and Sir William Chambers were in harness, there was a better understanding of the unity of the arts. But because the period was a formative one, the larger vision of architecture did not assert itself. The intention was there, but the age had not risen above stereotyped classicality and competition with the works of the old masters, the result being a perfection of sorts in monumental buildings and paintings. The artists of the late eighteenth century failed to express the changing life of their time, and had no perception of the vast forces at work in their midst. This is the chief difference between the age of the later Georges and that of the sixteenth century in Italy. The tendency during the academic period of English art was to aim at perfection of effect without paying due heed to primary cause. Once started on this particular avenue of tradition, the three divisions of art have ever diverged. To-day the force of external circumstance is such that architecture has, by its own power, asserted itself, and herein is the reason for the need of an architectural director as head of the National Academy.

No one would deny that the Royal Academy is a splendid institution. It holds annual exhibitions, and it holds the mirror of uniformity up to contemporary art. But the Academy follows rather than leads. It is controlled solely by the painters, who believe the true destinies of art to lie in their hands. The painters regard the architects as gentlemen who effect tricks with bricks; the art of building is looked upon in some quarters as scarcely an art but a kind of geometric science. The painters and the sculptors do not realise that they are insulting the goose with the golden eggs.

The Royal Academy to-day is not fully representative of the vitality of the Arts. In the sphere of education it fails singularly. Instead of providing a finishing atelier for advanced students, its schools are maintained as cradling places for the very young. The formula devised in Georgian times, both for education and emulation, is deemed all sufficing for modern life. From the standpoint of architectural advancement the issue seems clear enough. Cinderella is quite a leading lady in these industrial times. She demands recognition from her less favoured sisters. Hers is the right to rise from contemplating the dying embers. She has acquired sufficient wisdom to enact the rôle of enchantress.





R.I.B.A. Prizes and Studentships.

The Victory Scholarship. "A Faculty of Fine Arts in a University": Winning Design.

By MISS BETTY SCOTT (Architectural Association).

New Altar Piece in the Lady Chapel of St. Margaret's Church, Leicester.
EXECUTED IN GESSO RELIEF, GILDED AND COLOURED. BY MR. REGINALD HALLWARD.

APPLIED CRAFTSMANSHIP

BY REGINALD HALLWARD.

I.—MODELLING IN GESSO.

AT a time when there is so much interest shown in the work of personal craftsmanship, in addition to the need there is for higher standards, if we are to retain our position among the nations, any particulars about craft methods which have been found reliable are of importance. The nature of our undertaking will determine how far the craftsman should direct and execute the work himself, and I am approaching craftsmanship less in terms of its general applicability, as applied to industry than as it applies to the more imaginative conceptions of the artist. This latter, the so-called arts and crafts movement, has tended to despise, concerning itself more with the former. The recent exhibition of the Arts and Crafts Society, at the Academy was an instance of this and I think sometimes a new race of craftsmen will emerge, or rather that freeing themselves from all entangling associations, they will join together on another outlook, that, in fact, they are already doing so. We look at the work of craftsmen who knew nothing of moral and self-conscious aims, and yet achieved through the very simplicity of their outlook the highest results. We have so attached ourselves to "movements," to promoting everything; there is so much dependence on artificial stimulants and medicine of all kinds, that it is difficult for us to believe that beauty is best found when centred on itself, without any reason but its own loveliness. But we catch at recommendation and justification, looking outside ourselves, until a sickening philanthropy withers up all healthy impulse. This was instanced in the account given in the "foreword" to the catalogue of the late "Arts and Crafts Exhibition," in which it was stated that the personal craftsman's work found its justification in benefiting the "mass production manufacturer!"

Sadeik, or Priest's Chest, from an old Monastery in Minhi District, Burmah (1700 A.D.).
THE GESSO RELIEFS ILLUSTRATE THE LIFE OF GANTAMA BUDDHA.

The writer having been occupied over various commissions, executed in gesso relief, it may be of interest to give some account of the method of working. Gesso is made with fine whitening (gilder's whitening) and an admixture of glue. The amount of whitening required is placed in a bowl, mixed with water, and then left to soak for a little time, when it forms a paste of about the consistency of thick cream. Into this is poured the hot glue, sufficient to make it set hard when cold, but the right amount of glue can only be ascertained through experience. If there has been too much glue intermixed, the surface when dry will sparkle, and be likely to split. To prevent the material setting, during use, the bowl of gesso can be placed in an enamel basin filled with boiling water, up to the level of the gesso in the bowl—but not higher, as this causes a crust of glue to form on the top.

The method employed in preparing the panel for the altarpiece shown in the illustration, which measured 10 ft. 4 in. lengthwise, was as follows: a stretcher was made to the size, and to the front of this were affixed asbestos panels to secure a damp-proof base. To provide against the pull of the material, the stretcher was stayed with irons, fastened lengthwise to the back, and further to provide against the possibility of buckling the early coats of gesso applied to the front of the panel were also carried over the back. A full-sized cartoon having previously been made of the subject to be represented, the blocking in of the masses was achieved by tearing up thick felt undercarpet paper soaked in boiling water until it formed a pulp or soft mass. Gesso was then mixed into it and spread over the parts to be built up, by hand. The relief being thus blocked in, further relief was built up, by hand, with cotton wool mixed into gesso. When this had been carried far enough and when quite dry, it was carved on with wood carver's tools, and this method carried on alternately, modelling and carving, was continued until the final stages were reached. Brushes were then used to apply the liquid gesso, as it was essential to finish on a gesso surface and not a carved one, to preserve its own beautiful characteristics. I may mention here that the gesso surface must be quite dry before it is worked on. To work over the previous day's work while it is still damp will cause it inevitably to split, but before starting, the part to be worked on should be damped with a sponge.

Gesso relief occupies a place between painting and sculpture, and is perhaps more attached to the former, but this is no more than to say that the two are nearly allied. A distinction from pure sculpture becomes manifest when we perceive the advantage of colour and gilding for the completion of gesso relief—which in the former case is most often undesirable. These characteristics of gesso treatment can only be laid down tentatively, as it is possible also to work in the round with gesso, building up with coarser material such as toe, etc. G. F. Watts executed his equestrian statue, "Physical Energy," in this way.

These brief particulars would need ampli-

tication for the practice of gesso work, but represent the general method of approach as I have practised it, nor have I ever found the smallest tendency of the surface to crack, or to prove in any way impermanent. On the contrary, its permanence has been shown in examples coming down to us from early ages, and the eighteenth-century Sadeik or priest's chest (in my possession), from an old temple in Burmah, is an example of its use in the ornamental treatment of surfaces. (See illustration.)

I want to protect myself, however, from any complicity with the notion that craftsmanship is enough. Justification by craftsmanship is insignificant as a plea by itself, though implied in any work of art. We have to reach beyond this notion which ignores salient facts. Nor is this to make any mystery of the matter, but is merely the statement that the requirements of beauty extend beyond materials and achieved experience. For the nature of man projects itself intuitively beyond the range of the known when creating a work of beauty, and we see only the effects of causes, imperfectly understood. It is for this reason that beauty remains mysterious in its source, and that craftsmanship is not enough with which to reach it.

So I see the craftsman emerging from dependence on the merely fortuitous aids addressed to his welfare. I should like to see a society which should be called "The Union of the Unknown," but for the danger of its inevitable distinction, and of which I would wish to be one of the humblest members. It should have no reforming philanthropies of the "encouragement of art" kind, and no atmosphere but that of quiet confidence in work done well, and in real union together; thus abandoning artificial aids, beauty would be seen to encourage itself. And in this belief, that beauty is its own witness, and can speak for itself, we should avoid all preaching and addiction to coterie, and all that overorganisation which distrusts the best.

It has been said with much truth that what has been thought by one man, will, when held by a number of people together, lose most of its original meaning, so we should adopt no second-hand derivative, or authorised views about art, believing there are none. Nor should we concern ourselves about it, because it happens better without these solemnities, and is really the tradition of all noble work—but think of living, and having learned to live, all the rest must follow. So having no politics but friendship, our art would once more embrace the many. Thus spiritually united we should require few rules, and no protection, and the era of reforms, of multiplied machinery would gradually disappear, as health has no need of medicine or the physician.

In my next article I propose to give an account of methods of gilding and colouring gesso relief.

R.I.B.A. STUDENTS' COMPETITIONS

A LARGE array of drawings indicate a wide and intelligent interest in the competitions at the Institute this year. Though there is nothing of quite outstanding distinction, the response as a whole is most encouraging.

"Bruno" (Frank Scarlett, B.A.) wins the Alfred Bossom Travelling Studentship Gold Medal and £250 with a good design showing a carefully-thought-out plan and well-balanced simple exterior. None of the competitors give direct daylight into the central corridor halls, and artificial light is largely depended upon. Whether their plans are ideally perfect we are doubtful.

"Spes" has a less economic plan, for he gives wide, open spaces of entrance to the quadrangle, between which is a block of only about half the height of the main buildings, but his elevations are admirable—the best of all, perhaps.

Notwithstanding the large number of entries for the Tite Prize and the high average quality, the competition has not perhaps reached quite the highest level we have seen. The winner, "Worse" (Wm. Crabtree, Liverpool), has produced some charming drawings. His plans and elevations are alike good. The quiet, simple treatment of the elevations must be highly commended. "Wuf," "Cressonnée," "Wannah," "Bantu," "Leo" and "Tosky" have produced designs which offer encouraging signs for the future of their authors.

The Pugin Competition has elicited a quantity of admirable drawings. It is won by Mr. R. H. Matthews, Edinburgh University. His drawings are excellent and show very rare sympathetic rendering. Specially good are the drawings and sketches by Mr. F. W. C. Adkins, who must have run the winner very closely; it would be almost impossible to have more excellently rendered drawings.

The Victory Scholarship for a Faculty of Fine Arts in a University is worthily won by Miss Betty Scott. "Ovolo" is a design of very distinct merit.

The Owen Jones student, 1927 (Miss Ruth Ellis), is represented by some excellent designs.

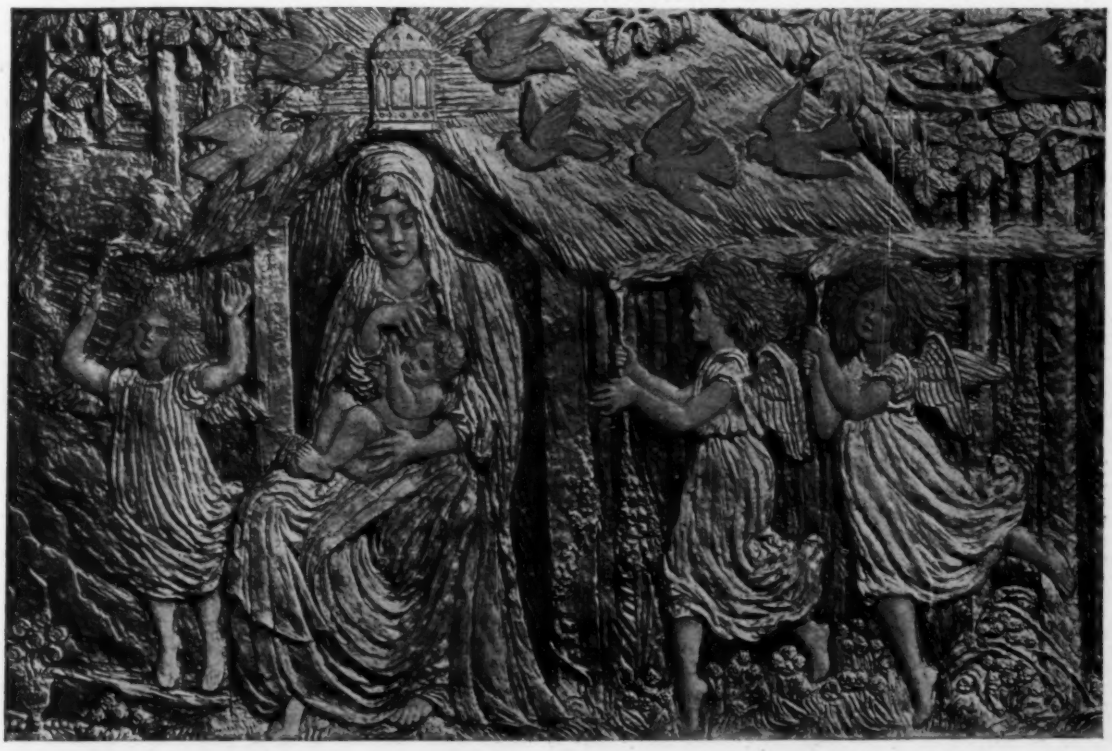
Some admirable drawings are the work of Mr. Hope Bagenal, who gets the Silver Medal and £250 for the Goodwin and Wimperis bursary.

Mr. E. P. Warren.

We regret to record the death of Mr. Edward Perry Warren, Hon. Fellow of Corpus Christi College, Oxford. He was not only a great collector of Greek antiquities, but also a classical scholar of singular humanity and erudition. He was an American by birth, and came of a well-known Boston family.

Shortly after leaving Oxford he settled at Lewes, where he began collecting Greek antiquities for American museums with the late Mr. John Marshall. Among the many interesting works of art which at one time formed part of his collection was Rodin's Le Baiser.

Mr. Warren was a most generous donor to institutions of learning, both in this country and in America, and the Ashmolean Museum at Oxford is indebted to him for one of the most perfect fifth-century bronze heads in existence.



Virgin Group from Altar Piece in Gesso Relief in Lady Chapel of St. Margaret's Church, Leicester.
BY MR. REGINALD HALLWARD.

THE TREND OF 1928

BY HOWARD ROBERTSON, F.R.I.B.A., S.A.D.G.

A SUMMARY of the year's activities may show it to have been fairly bristling with events, and yet so many of these may have only a temporary importance. When the architectural reviewer looks back upon the past twelve months, he sees a catalogue of happenings, a mass of detail. And the bulkier the catalogue the greater the feeling of satisfaction at the work accomplished. There is a comforting sense of bustling activity, of business despatched, in the survey of a mass of detail which has all received attention. One can always grasp a detail and cope with it. It is dealt with and filed away. The desk is cleared and ready for the succeeding item.

But in this satisfaction lurks a danger. The active occupation with detail matters bespeaks, in a sense, a kind of mental lethargy. It excuses preoccupation with bigger things. When detail is crowding in, there is no time for reflection, no leisure for individual thought, or, at least, there is none without great effort. Fatigued by a quasi-automatic routine, the brain is chary of tackling bigger problems. And so it happens in the world of business, where hard experience has taught the value of organisation, that we find two types of mind, or rather two types of function. The detail function, the organising function. Occasionally, rarely, we see these two combined in a person of exceptional capacity. But, as a rule, there is too much value in the creative faculty to permit it to be harassed by detail, too obvious a risk of failing to see the wood for the trees.

Sometimes it seems, particularly at this season of the year, when the index of our past activities is soon to be compiled, that we in the architectural profession are falling into the error which in business is avoided; that we are doing many things, and many of them well; but that, individualistic as we are, each in his field, we sometimes fail to accomplish the bigger things—the things for which, by taste and training, we are so obviously fitted—things in which, could we but lead, the public would support us.

Our functions, as architects, are numerous and difficult, and beset with trying detail. But in the main—can we but forget the detail—we find we have two principal duties to perform: that of serving our clients and that of serving the public. As individuals we do our best, particularly in the discharge of the first duty; but as a body it sometimes seems that we are not really a success; that in many ways we lack unity, common ideals and objectives, and consequently force; that the architectural profession has not its proper standing, that it lacks the authority which is increasingly acknowledged to medicine, to accountancy, to the law. It may not be so; the member of any organisation is always apt to adopt the critical attitude, and he obviously lacks detachment and perspective. But if there is a suspicion of a doubt, it behoves us to be frank, to examine our weakness, and, if possible to reinforce our driving power as an important section of society.

The day is coming—it has indeed already dawned—when it is essential in every matter to plan ahead. Events, as far as humanly is possible, must be foreseen. Plans must be laid to deal with their possible consequences. Action is forced upon nearly everyone to-day, through the astounding rapidity of change. But, nowadays, action after the event is of little use; the prizes are to those who can foresee, and prepare. In this particular field of preparedness, it cannot be said that architects, as a body, have shown themselves to be particularly distinguished; and perhaps that is why, to-day, we do not hold the position of authority to which we might well aspire. We build good houses, as individuals, for the working classes, better probably, all things considered, than those erected by official bodies. But in housing, as the late Sir Charles Ruthen said, we did not pull our weight. Whatever may be the pros and cons of the discussion which raged about the famous attack on the profession which Sir Charles let loose, it cannot be said that the profession has dominated as a body, in the way it should, the field of housing.

To what extent, during the past few years, have architects influenced the vast building activities which have clustered about the creation of our great arterial roads? Have they, as a body, been consulted? Have they been asked to contribute advice, ideas? If not, why not? Mr. Guy Dawber, in his address at the Bath Congress, quoted the example of Westchester County, New York, with its systematised scheme for building along arterial roads. Evidently, the interest is alive; we all deplore what has happened. But have we, as a body, done much to prevent it?

Then, again, there is the vast question of town planning, in London and the provinces, problems of traffic, of areas to be rebuilt, of schemes to cope with probable future development in transport and changes in living conditions. Are we being asked, as a body, to help in the solution of these problems? Are we in a position to make it appear as intensely unreasonable that we should not be asked? Have we any say in the selection of those who may be appointed to the task of evolving some general plan, a plan which will vitally affect our future welfare?

We see, on another count, the comforting existence of the Council for the Preservation of Rural England. We know some of the names connected with it, names that stand high in the architectural profession. But was the Council, was the idea behind it, generated by the profession itself? Can we thank the body of architects in England for this public-spirited effort?

But enough of questions! They are, no doubt, in the main rhetorical, perhaps entirely vain. They are asked in a spirit of self-examination, in the mood of introspection which comes with the passing of another year. If all is well, a little philosophising has done no harm. But if, as members of a profession, we are like so many faggots which need a binding, we may think it worth while next year to drop for a space our minor questions, in order to discuss a few main issues. Or, perhaps, as an alternative, take to ourselves an architectural Mussolini.

Below the surface of the big stream of architectural activity in 1928, whatever its pace or direction may be, the minor currents have been brisk. The year began with the triumph of a lady, Miss Scott, scarcely graduated from her studies at the Architectural Association. Her design for the Shakespeare Theatre, in its modern tendencies, is probably prophetic. But whether or no Miss Scott will influence architecture as an individual, her sex as a body is surely doing it. The modernity of woman's dress, so expressive of this age, so harmonious with her activities, the motor-car in which she drives, is spreading now to the furniture of her home, soon to the home itself. In two big London exhibitions we have witnessed what almost amounts to the setting of the seal of commercial approval upon "modernity" in furniture, textiles, glass, furnishings and equipment generally. The trend of the year, whether we like it or not, is towards this new expression, which is becoming more refined, more worthy of being called a style, as more and better brains are attracted to its possibilities. One result, at least, is beneficial: activity is everywhere manifest, and interest is widespread. Once more we see lay papers, daily and weekly, devoting pages to this new development, and we follow with interest (and secret joy) the articles of women journalists on the failings of to-day and the promise of to-morrow. Le Corbusier has appeared in English in one book, and another, his "Urbanisme," is soon to astonish us afresh. The ultra-modern house is no longer quite a bogy; we are prepared to accept in it what is good and reasonable. We will not be Mallet-Stevens, or Oud, or Gropius; but we are preparing to expect that plate-glass may be wanted by some misguided clients, and to admit that, if it is, we may have to give up the complete Georgian in order to make it fit.

On the Continent we find that modernism, in some form or other, has practically swept the board. It may be the classic modernism of Asplund in his Stockholm Library, the concrete modernism of Karl Moser in St. Antoine at Bâle, the brick modernism of Wydeveld and de Bazel in the Amsterdam housing, the gay exhibition modernism of the Pressa Exhibition at Cologne, or the still more light-hearted go-as-you-please modernism of the Parisian shop-front. Wherever one travels, in whatever paper one looks, there is modern everywhere, even in America, where the old-established Renaissance leanings of a big firm like Holabird and Roche, in Chicago, have given way under the pressure of the twentieth century movement. We are not arguing the case; as the French say, "*nous nous contentons de constater.*"

Abroad we see some encouraging tendencies. Better housing, better schools, great enterprises for public welfare such as the Frankfurt Stadium, with its open-air swimming pools, race tracks, exercise grounds, all established in a setting of park-like charm. We see architecture better organised, more neat and comely, the suburbs of big towns trim and orderly, obvious evidence of design well considered as a whole. In each country we find a national expression in this modern work. It may be that art knows no frontiers, but it is undeniable, and comforting, that each country is continuing to retain its individuality. The modernism of Berlin is not that of Paris or Amsterdam, or even Düsseldorf. Modern architecture remains not only national, but even regional.

In England we find, also, less satisfaction in the *ensemble*, though the detail is at times distinguished. We triumph still in domestic work. Sir Giles Scott even receives the R.I.B.A. street frontage medal for a house—his own—and foreigners will probably come to peer into his friendly windows: The penalty of fame! These same visitors will continue to admire Welwyn Garden City, with its admirable new theatre, so calm without, so jubilant within; and even now there is nothing abroad which quite approaches the Hampstead Garden Suburb, which this year celebrated an honourable "twenty-firster."

In the field of large buildings, there is much of interest, less of outstanding merit. Celanese House is a fine building, Grosvenor House a stupendous undertaking, the new Underground offices in Westminster promise many delights. Remarkable in its way is the Carreras factory, with its bold scale and general fearlessness of aspect, and becoming daily more impressive is the new School of Hygiene and Tropical Medicine in Gower-street. We have nothing to be ashamed of, after all. Our architecture is growing firmer and finer; but there are still too many buildings, on big, important sites, whose façades are utterly unworthy. Badly composed, and coarsely detailed, they flaunt huge, untidy electric signs in the face of a too tolerant public.

In shop fronts the trend is towards the modern. Riddington's, Helen Rubinstein's, in Dover-street, Emberton's shoe shop in Princes-street, Edinburgh, and the new shop for Best and Lloyd are good examples, to which may be added a neat collection in Regent-street. Without doubt, the freedom of modernism, with its facilities for effects in metal, glass and light, makes it supremely suitable as a medium for the display of modern objects.

A sign of the times, a satisfactory one, is

the advance shown by Messrs. Lyons in the design of their latest Corner House in Oxford-street. The interiors, with their magnificent spaces, their clean, marbled gaiety, their soft and brilliant lighting, cannot but have a good effect upon the taste of their enormous clientèle. In comparing the decorations of this building, so carefully studied and finely executed, with those of the other recent Corner Houses, one feels that the improvement is as enormous as it is significant in its promise.

In other fields besides actual building work, there is subject-matter for congratulation; in politics, where we see the Registration Bill leaping its third hurdle in the House of Lords; in science, where we follow with sympathetic attention the work of Dr. Stradling and his colleagues in the Building Research Station at Watford; and in the Press, where we find architecture finally taking a more honoured place. But here the rose is not without its thorn. For while architects are beginning, at last, to sign their buildings with greater willingness, the papers continue, with an unchanged obstinacy, to publish buildings without their author's name.

HOUSING AND THE SUBSIDY

THE intentions of the Government in regard to the continuation of the subsidies for housing were revealed on December 7 last, when the Minister of Health (Mr. Neville Chamberlain), in reply to a question in the House of Commons, made an announcement regarding the future arrangements as to the housing subsidy, from which it appeared that it was proposed to issue an order altering the contributions payable.

From the draft of the order issued the following day it appears that:—

> The order of 1926 respecting houses in England and Wales which have not been completed before October 1, 1929, is revoked, and it is now provided that towards these houses no contributions shall be made by the Government under sections 1 and 3 of the Act of 1923, as amended by section 1 of the Act of 1924. Respecting similar houses in Scotland it is ordered that, instead of a contribution of £6 payable annually for 20 years, the Scottish Board of Health shall contribute £4 annually for that period. This also relates to sections 1 and 3 of the Act of 1923, as amended by section 1 of the Act of 1924.

The general effect of this order is to put an end to subsidies under the Act of 1923 as from the end of September, 1929, in England and Wales and to reduce the subsidies payable in Scotland under that Act by £2 per house as from the same date. As it is under the subsidy arrangements of the Act of 1923 that private enterprise has been induced to operate to such an extent that it has been responsible for providing approximately half of the total number of houses built annually since 1923, it is the operations of private enterprise which are likely to be most affected by the present order.

The order also deals with the subsidies payable under the Act of 1924, which was intended to facilitate the production of houses for letting purposes, thus:—

> So far as respects houses which have not been completed before October 1, 1929, the contributions provided by the Minister or the Board under section 2 of the Act of 1924 in the case of houses which are subject to special conditions shall, instead of being a contribution of £9, or, if the house is situated in an agricultural parish, £12 10s. payable annually for a period of 40 years, be a contribution of £6, or in the case of Scotland £7 10s., or, if the house is situated in an agricultural parish £9 10s., or in the case of Scotland £11, payable annually for a period of 40 years.

The total number of houses completed under the Acts of 1923 and 1924 for the year ending September 30, 1928, was 101,761. Of these 47,969 were under the 1923 Act and 53,792 under that of 1924. Of those completed under the former 6,200 were built by public authorities, 41,206 by private enterprise, and 563 by public utility societies. The corresponding figures of those built under the Act of 1924 are 52,990 by public authorities, 718 by private enterprise, and 84 by public utility societies. The total number of houses erected in England and Wales since the end of 1919 is now about 1,200,000; of these about 400,000 have been erected without the help of the subsidy.

For the year ending September 30, 1927, the total number of houses completed, including non-subsidy houses, was 289,151, and for the corresponding period ending September 30, 1928, the total number was 185,722.

That large production of 1927 appears to have been absorbed, but it would seem has satisfied the demand at the price level prevailing during that period; otherwise the amount of construction at the lower price levels of 1928 ought to have approximated to that of 1927, and no doubt it could have been supplied since the resources of the industry were ample and no increases of cost due to rises in either wages or materials were to be apprehended.

It may be assumed, therefore, with some confidence that the number of houses completed for the year ending September 30, 1928, viz., 185,722, represents approximately the extent of the present demand for houses at the price levels prevailing in 1928, and that in default of a lower price level being reached there would be a further decline anyway in the demand in 1929. A lower price level will possibly be available some time in 1929, and therefore a new source of demand will be tapped.

Just how large that new source of demand will prove to be may be a matter of opinion. It may well be such that the output of houses to September 30, 1929, will hardly be inferior to that of the previous year. It is difficult to

Perthshire War Memorial. Restoration of the Church of St. John, Perth: View from South-East.

SIR ROBERT LORIMER, A.R.A., F.R.I.B.A., Architect.

find any ground for placing it much higher, and it may, indeed, be considerably less. It is common knowledge that there is still a very large unsatisfied demand for the cheaper classes of houses, a fact which the Government recognises by maintaining the subsidy under the 1924 Housing Act beyond September 30, 1929, although at a reduced rate. Much must depend upon the amount by which the present price level undergoes reduction. The larger the reduction in the cost of producing houses, and the lower the price level at which they can be placed upon the market, the larger will be the possible demand for the ensuing twelve months.

At the beginning of 1928 there was a reduction of wages under the cost-of-living sliding scale of the National Joint Council for the Building Industry. There is no chance of any similar reduction now before February 1, 1930. There are, therefore, only two directions in which a reduction of the cost of production can be looked for, namely, one by a fall in the prices of building materials, and the other by an increased output relative to the wages paid and the oncost charges incurred. A considerable fall in the price of materials took place during 1928—due, it is to be presumed, to a decline in demand.

There is some indication that the demand for building construction, other than housing, is improving. Unless, therefore, there is a further marked decline in the demand for housing construction during the next few months, there is not much ground for anticipating any further considerable drop in the prices of materials for such construction. It would appear, therefore, that it will be mainly to increased output that the public will have to look for a further substantial reduction in the cost of housing in the near future.

ENGLISH COMMERCIAL BUILDINGS—I

By F. E. BENNETT, A.R.I.B.A.

THE MANUFACTORY.

INDUSTRIAL buildings or factories do not form themselves into nice neat groups that may be classified and contrasted one with the other, as some less utilitarian types of buildings do. Since the earlier days of the Industrial Revolution, when the rise of commercial prosperity brought the first of the new type of buildings into being, the number and size of factories has steadily increased, and all corners of the country have become invaded by members of this ever-increasing population of buildings.

Often carried on in the homes of the individual employees, the old hand-worked industries, spread over large areas, have been re-formed and collected together into centres where they are housed into structures devised and executed with all the ingenuity which modern science and enlightened thought can stimulate.

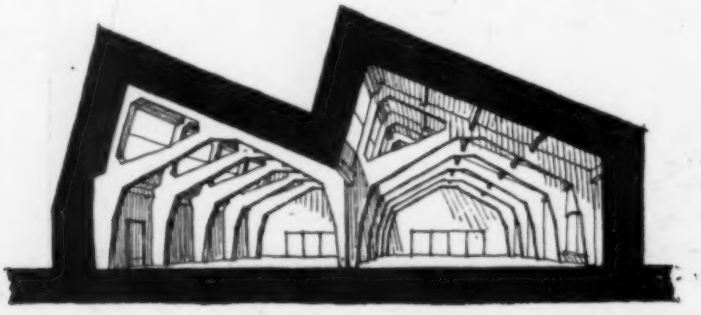
With the many and entirely differing forms of manufacture carried on in the country, it follows there is the greatest possible variety in the forms of manufacturing buildings, and it would be difficult to find two of them that were in very many ways alike. One factory produces biscuits and is three stories in height; another produces nails, looks similar from a distance, but is fitted with an entirely different equipment. Two factories produce boots; one is tall and narrow, but the other is low and spread out.

Apart from shape, how many other factors are there not which cause buildings of the same industry to differ from one another? Age or newness of the business; adversity or prosperity of the business; enterprise or slackness of the controllers—these factors invariably show themselves in the premises and equipment of a producing concern. Unlike the private house, which the tenant occupies only as it suits his convenience, the factory is the bodily form of the industry which called it into existence, and it rarely changes the nature of its use, and even when it does so it probably undergoes the stress of painful remodelling.

Concurrent with the growth and spread on every hand of industrial buildings, one sees the signs of the struggle of the new materials to assert themselves and gain the places of honour over those materials of less plastic value but of more traditional certainty. There has been a battle of the structures, and now the period of stone and cast-iron recedes in favour of the steel and concrete era.

Up to the time of the War the concrete building was still an unusual thing, and still looked upon as something in the nature of an experiment. During the War, however, the sudden call for new buildings wanted quickly and sometimes regardless of cost, brought a new impetus to the concrete movement and encouraged greater freedom in the use of the material. In the case of steel the War had not so much effect on the nature of its use as on the facilities for its output. New installations for the mining of raw material and for the conversion to the finished product left us after the War with a steel manufacturing industry capable of meeting economically and with ease all the needs of post-War building work.

It is to be observed that while stone and brick continue to be used as protective materials against the elements and as structural materials in smaller types of buildings, the steel framework cased in concrete is now universally accepted as the normal method of forming the structural basis of all large buildings. With the units of the steel framework which the makers can supply standardised and elaborately catalogued, it has become comparatively easy to erect a building within the requirements of the building laws and at the same time more or less inexpensively. In the disposing of structures, a greater facility has now become possible to provide the peculiar forms which certain processes may require.



A Japanese Factory.

In addition to the main producing factory which comprises the body of a business, other portions, either as separate buildings or as adjuncts to it, will be necessary to form a self-contained colony. There will be the power house and boiler house; there will be a raw goods store and a department for finished goods, and possibly a building for by-products. In addition to these there will always be some form of administrative department and an office.

The relative positions of these buildings, particularly when they are large, calls for careful consideration, the spaces between being left amply wide for adequate ventilation and the movement of traffic. An exact knowledge is required of the movement of materials during the process of conversion from the raw state into the manufactured articles. The movement may be horizontal or vertical, or both, and departments may be required to have intercommunication. The architect must be acquainted with the detail working of the factory; he must, as it were, live with the employees and be able to grasp the vitality of the life in the component buildings

If the main factory is a one-storied building, it will probably have north lights, and it may spread over a large area. Thirty-feet span is a reasonably economical limit, and the angle of the glass should be about 60 degrees. The many storied factory will naturally be restricted in its plan area because of the necessity to carry daylight into the centres of its floors, but it will be capable of some widening as the floor heights are increased. The building must be well lit and eminently fireproof.

The spacing of the steel bays more or less dominates the distribution of parts and produces a planning on the unit system. Each bay has its sprinkler-heads and its unit of lighting. Floors and roofs must be of concrete or other similar fire-resisting material and capable of taking the maximum live loads likely to be placed on them.

In addition to being fireproof and well lighted the factory may be required to be capable of easy extension—perhaps by adding additional stories—and of easy conversion for another form of manufacture.

For buildings requiring covered-in spaces of large span—notably those for the iron and steel industries—bold methods of carrying roofs are required. Complicated trusses or framed girders are necessary with perhaps additional stiffening to support gantries.

The chief thing about the finished goods department is that the floor level should be about four feet above the ground, so that the goods can be conveyed direct into motor wagons or railway trucks, and it is well to run the roof some distance out beyond the loading dock to protect the goods while they are being moved.

The form of housing for the power plant and the boilers can be arrived at fairly logically after the architect has received the lay-out plans of the installations from the consulting engineer. Remembering how proud business firms are to show off their engine rooms, it behoves the architect to be sure that the enclosing buildings remain a cause of satisfaction to the owners.

While the offices to a factory may be quite a detached portion, the administration department is directly concerned in the management of it, and must be placed so that workpeople can pass conveniently between it and their working points in the factory. For a large factory it should consist, firstly, of an ample vestibule or hall out of which open various subsidiary rooms, including: Time and wages office, manager's and clerks' office, rest room, surgery, clothes drying room, and cloakrooms, bathrooms and lavatories.

Recent years have seen rapid developments in the nature of buildings and grounds laid out for the better welfare of the workers, and examples are now numerous where the controllers of an industry provide houses and buildings of purely social function for this purpose.

THE SMALL HOUSE AND ITS COST

By A. EDGAR BERESFORD
(with sketches of houses designed by the Author).

At this season of the year one is apt to become reminiscent, just as the passing of a milestone leads one to look back over the country one has travelled. But it was quite by accident that, in turning out a seldom-opened drawer the other day, a roll of old sketch plans came to light; plans of houses built over twenty years ago. Such a resurrection is always interesting, and sometimes amusing, to the maturer eye, but in this instance it was something of a shock to be reminded, by the figures on the drawings, that small houses in those days could be built—and quite soundly built—for a price varying between 5½d. and 6½d. per cube foot! Ah, well——!

The problem of the small house, never an easy one, is nowadays, perhaps, more difficult than ever, since costs are so much higher all round; and it is to be feared that the average man, with from £1,000 to £2,000 to spend on a home, is inclined to believe that he cannot afford to employ an architect to design a house for him, but must needs go to the nearest "building estate" and buy something ready-made, *faute de mieux*. Here, at least, he will know what he has to pay and what he will get for his money, even though it is not by any means what he would have preferred to have as his home.

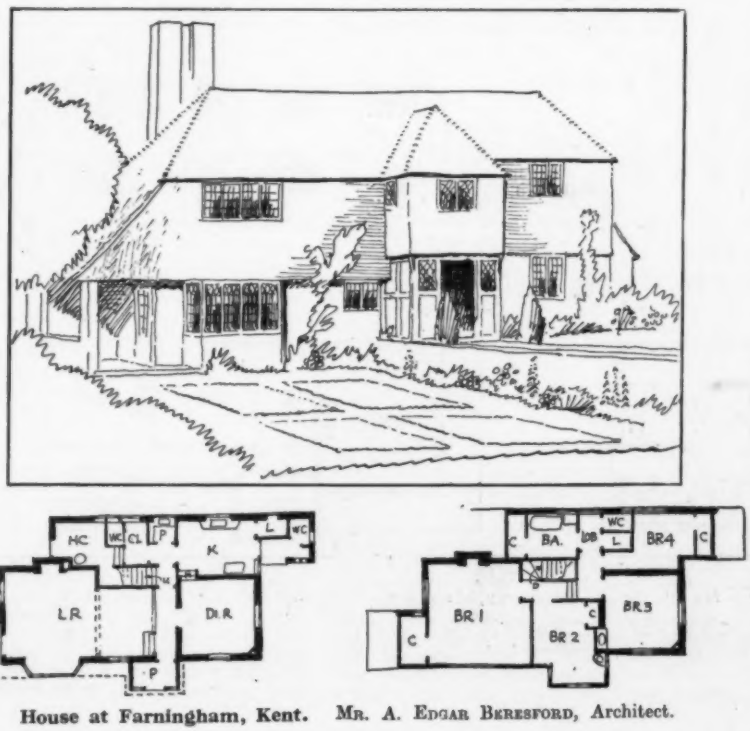
There are, however, still many people who want something different from the goods provided in the ready-made department, and who realise that, after all, to build for themselves is not necessarily more expensive or hazardous, but, on the contrary, may be decidedly cheaper and safer than to buy a house already completed. The world and his wife (especially "his wife") are to-day more interested in, and conversant with, house design than ever before; the increasing number of periodicals and exhibitions dealing with the planning and upkeep of houses—whether they may be considered as cause or effect—is sufficient proof of this; and many people of quite moderate means are anxious to acquire a home which shall in some way reflect or represent their own tastes and individuality, and are no longer content to inhabit one of a myriad of almost exactly similar type. To achieve this ideal at a cost comparable with that asked for the usual ready-made house is not at all impossible even in these expensive days, if the problem be tackled at the right end, and the rigid economy which has to be observed, far from being a hardship, is often of great benefit to design if it starts at the root of things by eliminating the old hard-dying fetishes of display and pretension.

The French call us a nation of shopkeepers, and really it seems as though the principle of display, of "keeping up appearances," governs our domestic buildings to a large degree. Whatever the plan, whatever the other sides may look like, the "front elevation"—the side facing the roadway—must be as imposing and expensive looking as can be devised in order to impress the envious passer-by! But surely a house—and, most of all, a small house—should primarily be a *home* and not a showroom; a place of repose and retirement to which one returns, as to a port from storm. Its aspects without and within should be as comely and pleasant as can be contrived without undue straining after balance or effect, but it should never have a "front" or a "back." To spend most of our effort and money on a handsome façade, whilst letting the back and sides take care of themselves, is surely the essence of ostentation and bad taste, yet how often does it persist even in these enlightened days! If some special external facing is desired, let it apply to *all* exteriors and not only to that most seen by the passer-by; unless we can afford to do this, by all means let us omit it altogether. In external design, the value of simplicity and directness cannot be too highly stressed, both on grounds of economy in cost and for its artistic value. The veriest tyro in architecture will readily recognise that an old cottage or farmhouse generally looks restful and undisturbing as compared with most new houses, and may wonder why it should be so. It is merely the straightforward use of very few materials which, by contrast with the fussiness and broken-up elevations of most new work, looks so reposeful. The beauty of an old house or cottage is only to a limited extent the beauty of antiquity. Whilst admitting to the full the charm of age, the mellowed colouring, the softening of outline, the harmonious blending of Nature's with man's handiwork, we may find by careful investigation that there are many other reasons why an old house generally looks beautiful and homely and a new one too often the reverse. And the patient study of old and unpretentious houses in the lanes and fields is of far greater practical value to the young architect than the measuring of elaborate details from some magnificent palace or abbey (apart from the purely academic or historical interest); for it accustoms the eye and the brain to proportions and values which will be of the utmost service to him in what will probably be the great majority of his life's work, the design of small houses. It is, incidentally, not only an amusing pastime, but also a helpful study, to take a picture postcard of one's favourite old cottage and try to make a modern plan to fit it!

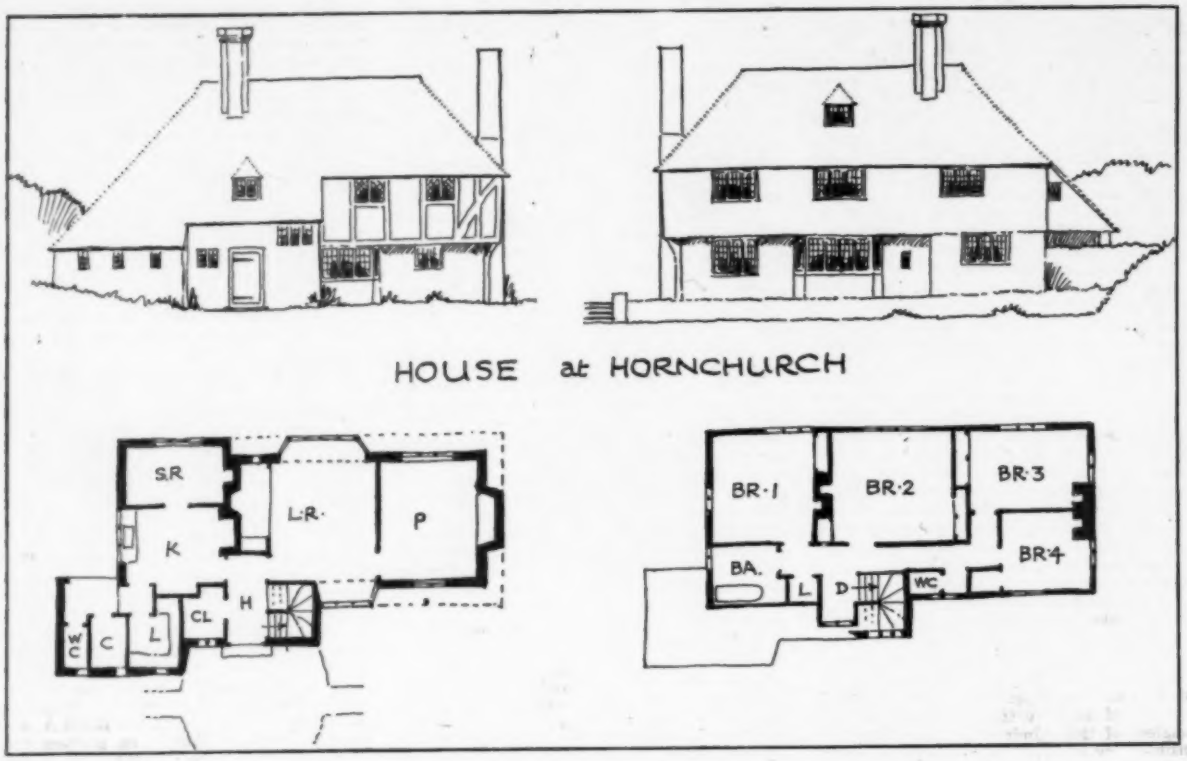
Enthusiastic admirers of our old cottages and houses sometimes go so far as to advocate the reproduction in new work of mediæval buildings, ignoring the changed conditions of life to-day. But that is very far from practical politics; we have to face the facts. But we can, however, adopt with great benefit many of the old principles, and of these perhaps the chief is the external simplicity and homeliness which has an additional virtue to-day in its economy of cost.

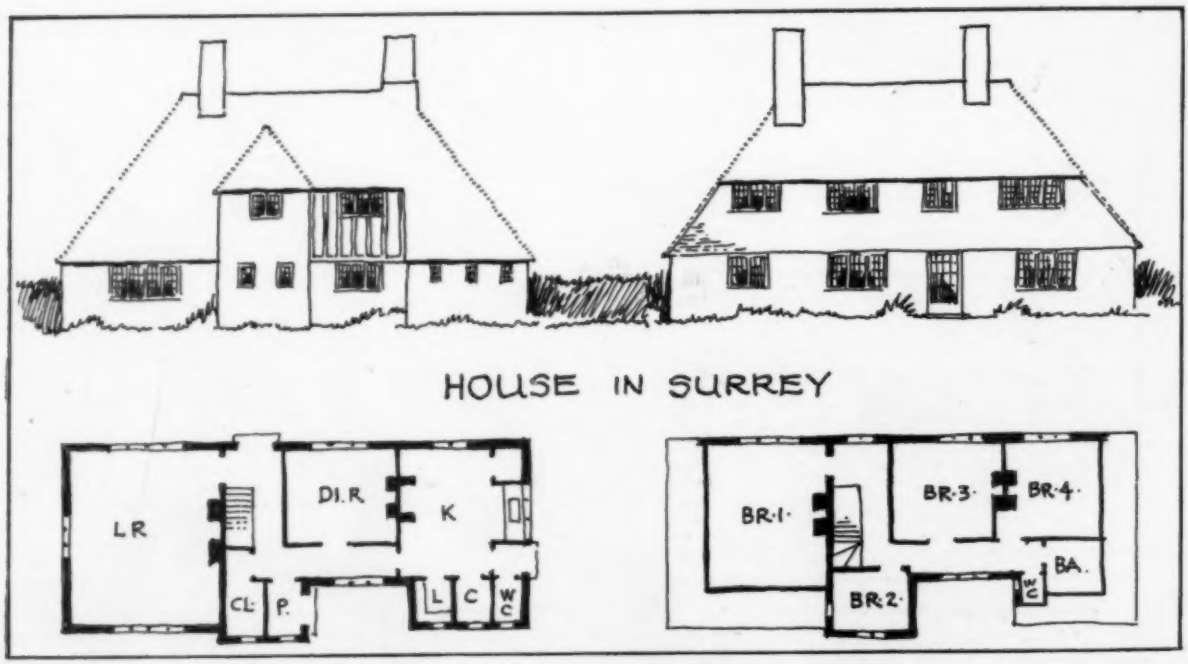
Straightforward and simple planning is, of course, essential, but even within the severely restricted limits of a small house there may be infinitely more variety and individuality than generally obtains. A man of taste, in building a house, will stipulate that not only shall it be adapted to suit his utilitarian needs, but that it shall have some definite character of its own which appeals to his special fancy, or make-up. And the lady of the house will most probably have several suggestions to offer which will provide scope for all the architect's ingenuity in scheming and contrivance! It will sometimes be found helpful to begin planning by thinking of the bedrooms first; for though the whole design should grow up together, inside and outside, the "first floor" is often the first floor to determine itself! The long-reiterated advice of architects to their clients that they should have a smaller number of larger living-rooms—or at least one big room—seems at last to be bearing fruit; and an ever-increasing proportion of small houses provide for one really good-sized living-room, with quite a small secondary room for use as a reception room for the segregation of the unexpected or unfamiliar guest or as a room for meals. This rearrangement of the average ground floor does not affect the cost of erection, but it is an undoubted economy and advantage in upkeep and comfort. At this time of the year, the question of warming the house is uppermost in our minds, and it is important, in comparing various plans, to consider how many fires will be required. In the old villa type of plan, with two sitting-rooms of approximately equal size, one, generally the smaller, will be used, fired and aired regularly; the other will be generally deserted, six days out of seven, in ordinary circumstances. It is too large to be quickly made habitable in an emergency by a gas or electric stove, and so for most of the cold weather it is abandoned to damp and chilliness. In the case of the other arrangement, however, the large room is lived in constantly, and so kept thoroughly warm, whilst the small meals room or parlour is of such proportions that it can be rendered comfortable in a few minutes when required, and, indeed, never becomes so chill and tomb-like as the Sunday drawing-room of sacred memory.

To meet what is known as the "servant problem," the kitchen quarters in the small house of to-day generally comprise a work-room and a sitting-room instead of the older formula of kitchen and scullery, and the modern housewife and her maid demand, quite rightly, all the latest inventions in the shape of labour-saving devices. Though things like fitted cabinets, electric refrigerators and wash-



House at Farningham, Kent. MR. A. EDGAR BERESFORD, Architect.





MR. A. EDGAR BERESFORD, Architect.

ing machines necessarily cost a good deal more to instal than the old open shelving and primitive fittings of pre-war kitchens and pantries, they are cheerfully paid for by any husband worthy of the name.

The desperate efforts made a few years ago to build cheap cottages were responsible for a number of experiments in building, some of which, adapted as they have been for use in small houses generally, have not tended to improve the average of design. Mass production and standardisation, valuable as it is in some trades, is inimical to individual and characteristic building if allowed to dominate design. Like fire, it is a good servant but a bad master. For it has long been a truism that success or failure in any building depends more than anything else on what is known as "scale"—that correct and judicious proportion of the various parts to the whole. And standardisation of units is, unfortunately, often at war with scale in small domestic work, which must necessarily comprise larger and smaller rooms closely adjacent to each other. It may be argued that it does not hurt a building much if all its doors are the same height and width: all its windows the same type and spacing. But there can be little doubt that, unless a much larger range of standard sizes than are at present available be introduced, we shall constantly find that our windows and doors are out of scale with our building, particularly if our house has the irregular and casual fenestration which is found in the old country work of pre-Georgian character. But, fortunately, the manufacture of large numbers of stock-size units has so reduced the cost that we can still manage to pay a little extra for a proportion of specially made sizes where the standards do not suit.

The use of locally obtained materials as an invariable rule has often been advocated as the only means by which our building will harmonise and blend with its surroundings. The neglect of this admirable rule has been responsible very largely for the disfigurement of rural England which has been so rampant in the last few years. The excuse generally put forward for the shoddy yellow brick bungalow with its pink or grey roof is that it is the best that its owner can afford. Yet in some parts of Britain it is still cheaper to build in local stone than in imported brick! In other areas it is true that materials once available near by are no longer so; quarries have been abandoned, brick and tile works closed down. But even when the same materials are no longer to be obtained it is always possible to use discrimination in the colour of the alternatives and to select only such as will at least harmonise with the old work or the natural surroundings. For the most part old and tried staple building materials will be found to be still the most economical; so many of the new synthetic materials, though cheaper to buy at first, prove, when fixed in the building and trimmed up, to have cost at least as much as the "old stingo" which they have superseded, possibly because of the innate conservatism of builders and workmen and of their reluctance to adopt any new methods: possibly because they rather resent, unconsciously, fixing a machine-made or prepared material which takes the place of their own or their mates' handiwork. This may sound fanciful, but there is no doubt that no really good work is done unless the doing of it has been enjoyed, and any job which is done unwillingly or grudgingly takes twice as long as that which is done happily.

If we can, in the design and construction of our buildings, increase the interest and enthusiasm of the men who have to build it, we are surely on the way not only to achieve something of beauty and comeliness, but also to economise the cost. And, if the incessant invasion of machinery in the preparation of building materials, which has up to now tended to destroy handicraft very largely, could be restricted to the doing of the "dirty work" and the drudgery of the trades, leaving a greater opportunity for initiative and interest on the craftsman's part, the undoubted gain in texture and artistic value need not cost us nearly so much as it is popularly supposed.

The bitter rebellion against the typical plan of the Victorian terrace house, with its bay-windowed front room next the road, its narrow passageway and straight, steep stairs, and its murky and ill-proportioned back room looking down a narrow strip of garden past the inevitable "back addition," bids fair in these days to be rivalled by the revulsion against the neo-Georgian type of oblong, hip-ended, semi-detached blocks which have been erected *ad nauseum* during the last few years, developments of the "housing scheme" cottages of 1920 with a few added trimmings. For the public taste now seems to have veered right round to an earlier manner, and Tudor gables and lattice casements are now once more in vogue. That long-called-for "twentieth-century style" does not yet show any signs of appearance! May we not still hope for the day when it will not be thought necessary to label every building with the name of some "style" or other: when straightforward, sensible home-building will be recognised as the composite product of all the best in tradition combined with the practical solution of modern needs?

CORRESPONDENCE

[While we are glad to publish letters on professional and other matters of interest to our readers, it must be understood that we do not necessarily endorse the remarks of correspondents, who will oblige us if they will express their views as briefly as possible.]

R.I.B.A. Development Scheme.

SIR,—The leading article in your current issue appears to me exceedingly helpful as a fairly stated summary at the moment of the initial discussion of so revolutionary a movement as this. I will be brief, as the demands on your correspondence column may be beyond your space.

The reasons which induced me to oppose the Parliamentary Registration of Architects compels me to object to this wholesale admission to the Institute, thus enabling more and more individuals to rank as qualified architects without going through the proper ordeal of examination.

Such a decision, you rightly say, must be a breach of faith with all who complied with that qualifying rule. Besides, it would make the R.I.B.A. more of a trade union than ever. The Development Schemers tell us this is "marching with the times," or employing suchlike misleading terminology, calling me, I daresay, "one of the might-have-beens," or "a voice from the past," and quite out of date as a "Retired Fellow" and so minus a vote. However, I can claim a unique experience for over half a century as art editor of a well-known professional journal and, in consequence, a personal friendship with most of the leading architects of the day, good Institute men, too. I can realise what they would have said to this "widespread net" of a scheme. My sole purpose is to prevent a setback to the advance of good architecture. It may be said I am trying to influence contemporary opinion by voicing an "echo from the grave."

Be it so if you will.

MAURICE B. ADAMS.

SIR,—Your leader of January 4 on the R.I.B.A. development scheme will doubtless set many minds working vigorously. It suggests "dilution" in its unqualified sense; and the result would, as you forecast, be the temptation to form yet another body to confuse an apathetic public, under the title of "The Architectural Elect" or some synonym. Is this for the good of anyone? Emphatically no! The Architectural Elect already have recognition of their special talents by other well-known bodies of "supermen" of all callings. Surely the "mixing" is best arranged for at the summit of Olympus than by obliterating the many ascending paths by "mixing" near the base.

The average needs, as a security to offer his clients, some proof of skill at his particular work. Hence a member of the R.I.B.A. should be now and always an architect. The result of the acceptance of the present proposals would be that our rising generation of architects would be thrown in the coming years into unfair competition with men of multi-professional activities. In fact, the present proposal is the swing of the pendulum. It is the antithesis of registration, and I for one am quite unable to imagine how the rules of the R.I.B.A., for its members could be enforced on the newcomers; whilst at the same time it would be impossible to harbour both fish and fowl in either pond or pen.

A MEMBER OF THE R.I.B.A.

SIR,—I have read with interest and amazement your leading article of January 4. I much admire the very moderate manner in which you have criticised proposals which are clearly destructive of the status of the R.I.B.A. What should we say of a man who had a cellar of valuable wine and, to make it go further, diluted it with a large quantity of water? But this is what the proposal really means. Those who in the past have worked in the face of much difficulty to secure a reasonable standard of knowledge and competency for the members of the R.I.B.A. now see the whole process reversed for the doubtful advantage of securing a larger number of members paying subscriptions and enabling the R.I.B.A. staff to be enlarged and possibly to provide funds for an advertising campaign. It is absurd to think that, having divested itself of most of its professional status and standing, the R.I.B.A. will be considered an authority on matters connected with the profession. Why not at once throw the R.I.B.A. open to the whole of the public?

In common with others, if I were not a member of the R.I.B.A. I would not now join it.

A FELLOW.

The Future of the Architectural Profession.

SIR,—Like others, I have for some considerable time been disturbed as to the future of the architectural profession, and this uneasiness has been intensified by my constant perusal of articles and correspondence upon this matter in your valuable journal, culminating in the recent suggestions for organised professional advertisement.

As an obscure draughtsman, and Associate member of that great and ever-growing society, the R.I.B.A., may I be allowed to state the view that salvation can only be secured by mass suicide? In the R.I.B.A. and its allied societies we have an effective organisation for putting such a scheme into operation.

For instance, lots might be drawn on a 50 per cent. survival basis (if this percentage were not considered too high), and every member would then have a sporting chance of either heroically sacrificing himself for the good of the Mistress Art, or of participating in an architectural millennium.

GEORGE JAMES BERNARD WILDE

District Surveyors' Examination.

SIR,—I fully endorse the remarks of your correspondent in the issue of *The Builder* for January 4. I venture to suggest that more candidates would enter for the forthcoming examination to be held by the L.C.C. if earlier notice had been given and more particulars supplied. Three months' notice is hardly sufficient for an examination of this nature, and when one applies for particulars of examination and syllabus of subjects one is supplied with a form of entry and particulars as to qualifications of district surveyors which only include three lines of print dealing with subjects of examination.

A note is made on the form of entry to the effect that all applications to sit for the examination must be received on or before March 1 next, and "full instructions will be sent in due course *to those who enter*." Surely the candidate should be supplied with a full syllabus before entering?

SURVEYOR.

The Abbey Sacristy.

SIR,—I have not noticed in your own, or in any other scientific journal, whether any progress has been made in the matter of providing suitable vestries for Westminster Abbey. I have, however, observed that the temporary building already put up on the north side of the choir is remarkably like the ancient building in its colouring.

I write these few lines, however, venturing to make a suggestion as to *the site* of the proposed new building; and it is this: Why should it not be erected in the centre of the *Cloister Court*? A small and handsome building, octagonal or square in shape, would not hide any view of the Abbey, or spoil the aspect of the beautiful cloisters, and could be easily approached from the north aisle of the nave. I should like to hear the opinion of all those who are interested—and who is not?—in the preservation of our national treasure in our venerable Abbey, as to whether this would not be a practicable solution of this question.

JAMES SIBREE,
(D.D., St. Andrew's),
(formerly architect of "Martyr Memorial Churches" and many other buildings in Madagascar).

P.S.—I certainly hope that the suggestion made by someone that the Chapter House should be used as a vestry will *not* be adopted. Besides which, the Chapter House is "national" and not ecclesiastical property.—J. S.

Bromley, Kent.

Concrete House Competition.

SIR,—Your correspondent, "Concrete Facts," from his criticism would appear to be a disgruntled competitor, and the statements he makes are surely not facts. With regard to price, it has been found that a well-finished concrete house can be built for the same price as an ordinary brick house and somewhat cheaper than a house that is faced with facing bricks. Incidentally, multi-coloured concrete bricks, stronger than clay bricks and not so absorbent, can be purchased for 80s. a thousand as against 130s. per thousand for clay.

As to economy compelling "a concrete house to be a plain rectangle," this certainly also applies to the brick-built house, and concrete, undoubtedly, can be employed in any position where brickwork can be; in recent erections, where bricks have been used for the general construction, concrete has been introduced for the more intricate or difficult positions.

Your correspondent further states that "the idea behind the competition is illusory in that it will stimulate the design of houses in concrete." Most likely this is a fact, but is it to be regretted it should be so, as concrete properly employed would prove much more satisfactory and economical than some of the recent brick-built edifices. If the competition could only engender a better knowledge of concrete among both architects and builders, a great service would be rendered to the community.

"NOT A COMPETITOR."

ILLUSTRATIONS, ETC.

The descriptions of the work illustrated in this issue are given on pages 104-108. General News and Competition News and Meetings are this week given on page 129.

COMPETITION IN CONTRACTING

By W. T. CRESWELL, Barrister-at-Law; Hon. A.R.I.B.A.; Associate (late Fellow) Surveyors' Institution.

IT is natural, just and right for one person to vie with another for the advantage of dealing with a third party. That is, to compete, which, though no doubt entailing much expenditure of labour, is not only a struggle for the survival of the fittest, but also a stimulus to individual development along accepted lines—and to a gradually advancing standard. Occasionally the unfair use of the method of competition is found in relatively unimportant businesses, but in these cases the fault lies not with the method but with the individual who, expressly or impliedly, represents that competition shall be sound and above-board, and subsequently acts in bad faith.

Monopoly is very often the result of unfair competition, and the above-mentioned evolution is disorganised by the successful competitor, who crushes out his rivals by any other means than by his own merit.

Competition by Contractors.

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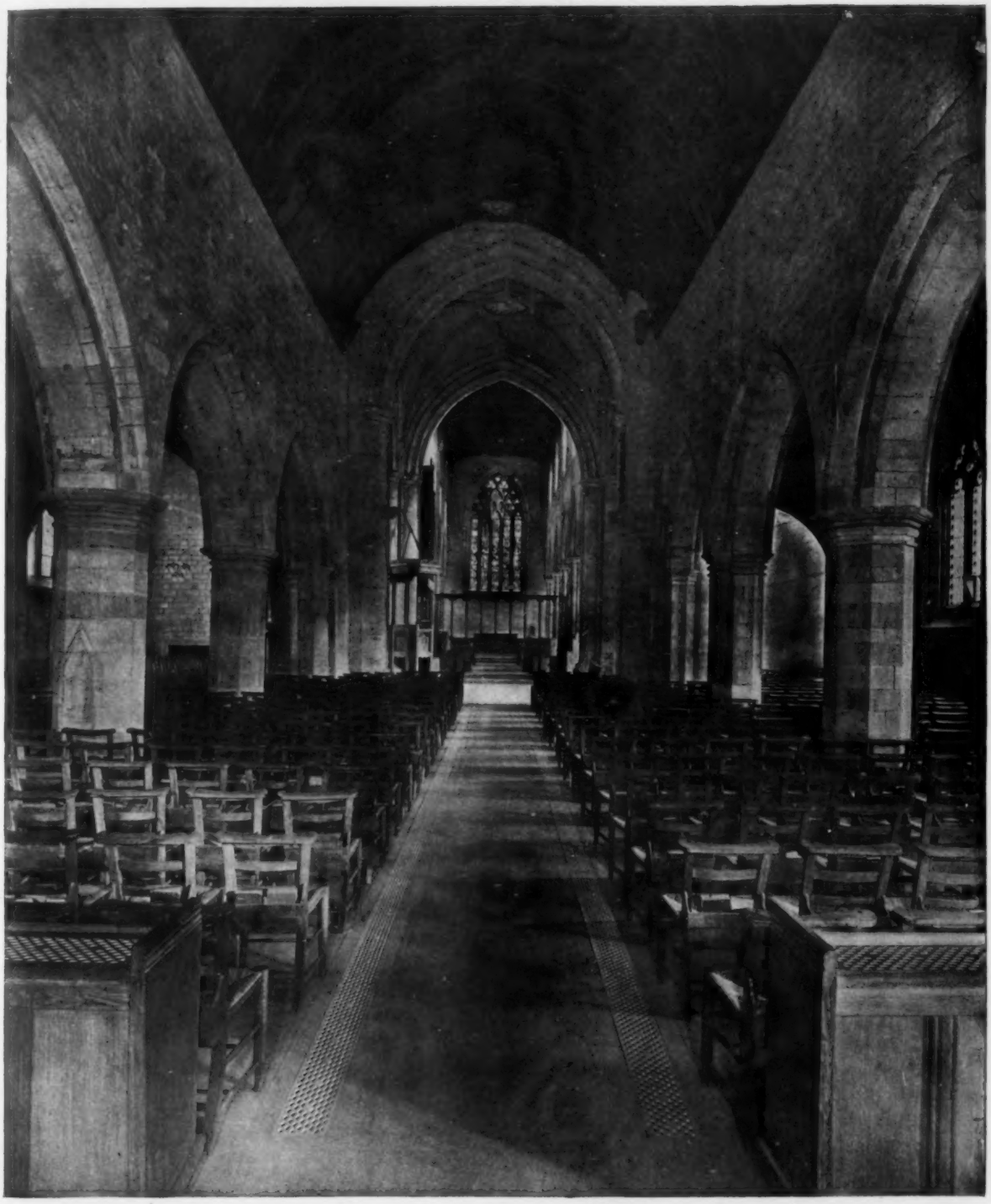
In every instance, if the designs, etc., of any competitor are used at all, the invitor becomes his employer and must pay for the work expended on the designs, their value being ascertained by a consideration of the reasonable cost of the labour and materials expended on them; and this, of course, applies also where any designs submitted in competition are used in some other enterprise than that for which they were ostensibly submitted.

If the successful competitor is subsequently further employed to obtain tenders for work, to be carried out according to his designs, a contract for their use is implied, including, also, repayment for any reasonable expenses he shall have incurred in connection with the transaction, and such remuneration and reimbursements can be recovered at law. Generally, judgment in each case depends upon the terms of the original written invitation to compete, and the same rules of law apply here as govern the acceptance of any kind of tender for work and labour.

If, for example, the original invitation to compete included a stipulation that the drawings submitted must comply with any by-laws, regulations, or other requirements of authorities concerned, and the employer has permitted the architect to proceed, however far, before it is discovered that the said requirements are not satisfied, obviously the architect has failed to show due care and skill, and cannot recover should the employer decide to stand on his rights.



Perthshire War Memorial. Restoration of the Church of St. John, Perth: View Looking East.

SIR ROBERT LORIMER, A.R.A., F.R.I.B.A., Architect.

A note is made on the form of entry to the effect that all applications to sit for the examination must be received on or before March 1 next, and "full instructions will be sent in due course *to those who enter*." Surely the candidate should be supplied with a full syllabus before entering?

SURVEYOR.

The Abbey Sacristy.

SIR,—I have not noticed in your own, or in any other scientific journal, whether any progress has been made in the matter of providing suitable vestries for Westminster Abbey. I have, however, observed that the temporary building already put up on the north side of the choir is remarkably like the ancient building in its colouring.

I write these few lines, however, venturing to make a suggestion as to *the site* of the proposed new building; and it is this: Why should it not be erected in the centre of the *Cloister Court*? A small and handsome building, octagonal or square in shape, would not hide any view of the Abbey, or spoil the aspect of the beautiful cloisters, and could be easily approached from the north aisle of the nave. I should like to hear the opinion of all those who are interested—and who is not?—in the preservation of our national treasure in our venerable Abbey, as to whether this would not be a practicable solution of this question.

JAMES SIBREE,
(D.D., St. Andrew's),
(formerly architect of "Martyr Memorial Churches" and many other buildings in Madagascar).

P.S.—I certainly hope that the suggestion made by someone that the Chapter House should be used as a vestry will *not* be adopted. Besides which, the Chapter House is "national" and not ecclesiastical property.—J. S.

Bromley, Kent.

Concrete House Competition.

SIR,—Your correspondent, "Concrete Facts," from his criticism would appear to be a disgruntled competitor, and the statements he makes are surely not facts. With regard to price, it has been found that a well-finished concrete house can be built for the same price as an ordinary brick house and somewhat cheaper than a house that is faced with facing bricks. Incidentally, multi-coloured concrete bricks, stronger than clay bricks and not so absorbent, can be purchased for 80s. a thousand as against 130s. per thousand for clay.

As to economy compelling "a concrete house to be a plain rectangle," this certainly also applies to the brick-built house, and concrete, undoubtedly, can be employed in any position where brickwork can be; in recent erections, where bricks have been used for the general construction, concrete has been introduced for the more intricate or difficult positions.

Your correspondent further states that "the idea behind the competition is illusory in that it will stimulate the design of houses in concrete." Most likely this is a fact, but is it to be regretted it should be so, as concrete properly employed would prove much more satisfactory and economical than some of the recent brick-built edifices. If the competition could only engender a better knowledge of concrete among both architects and builders, a great service would be rendered to the community.

"NOT A COMPETITOR."

ILLUSTRATIONS, ETC.

The descriptions of the work illustrated in this issue are given on pages 104-108. General News and Competition News and Meetings are this week given on page 129.

COMPETITION IN CONTRACTING

BY W. T. CRESWELL, Barrister-at-Law; Hon. A.R.I.B.A.; Associate (late Fellow) Surveyors' Institution.

IT is natural, just and right for one person to vie with another for the advantage of dealing with a third party. That is, to compete, which, though no doubt entailing much expenditure of labour, is not only a struggle for the survival of the fittest, but also a stimulus to individual development along accepted lines—and to a gradually advancing standard. Occasionally the unfair use of the method of competition is found in relatively unimportant businesses, but in these cases the fault lies not with the method but with the individual who, expressly or impliedly, represents that competition shall be sound and above-board, and subsequently acts in bad faith.

Monopoly is very often the result of unfair competition, and the above-mentioned evolution is disorganised by the successful competitor, who crushes out his rivals by any other means than by his own merit.

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Methods of exchange and barter, and the general law of supply and demand, led logically to competition amongst vendors and vendees, each for what the other had to offer, and this, spreading gradually through the simplest dealings of daily life, made contracts necessary for security and evidence of good faith—and finally, organised competitions to contract or invitations to tender provided the means for selecting the most desirable contractor in any chosen area—and during the interval from the middle of the nineteenth century up to the present day, the method has come to be adopted in all departments of the building trade.

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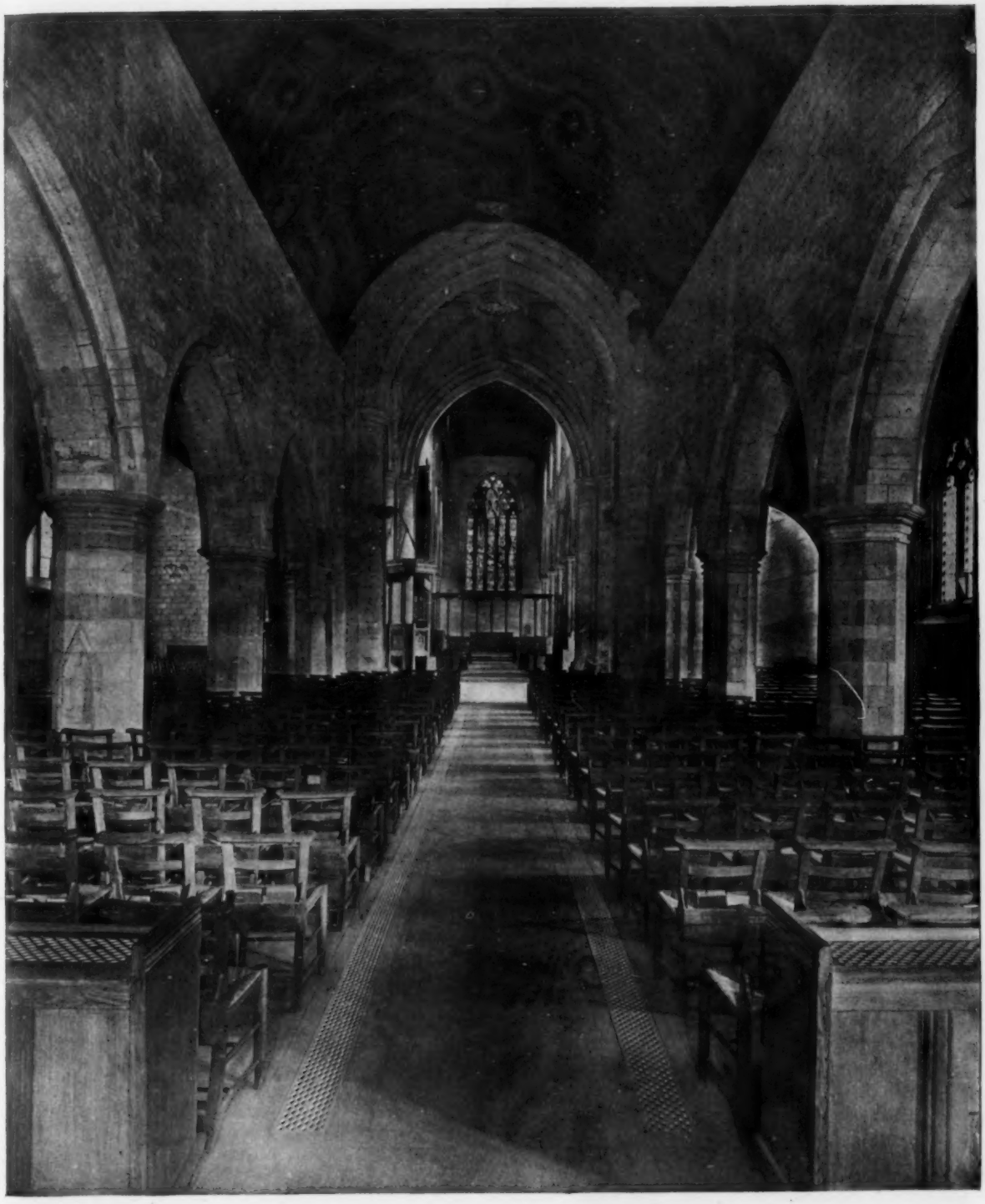

Perthshire War Memorial. Restoration of the Church of St. John, Perth: View Looking East.

SIR ROBERT LORIMER, A.R.A., F.R.I.B.A., Architect.

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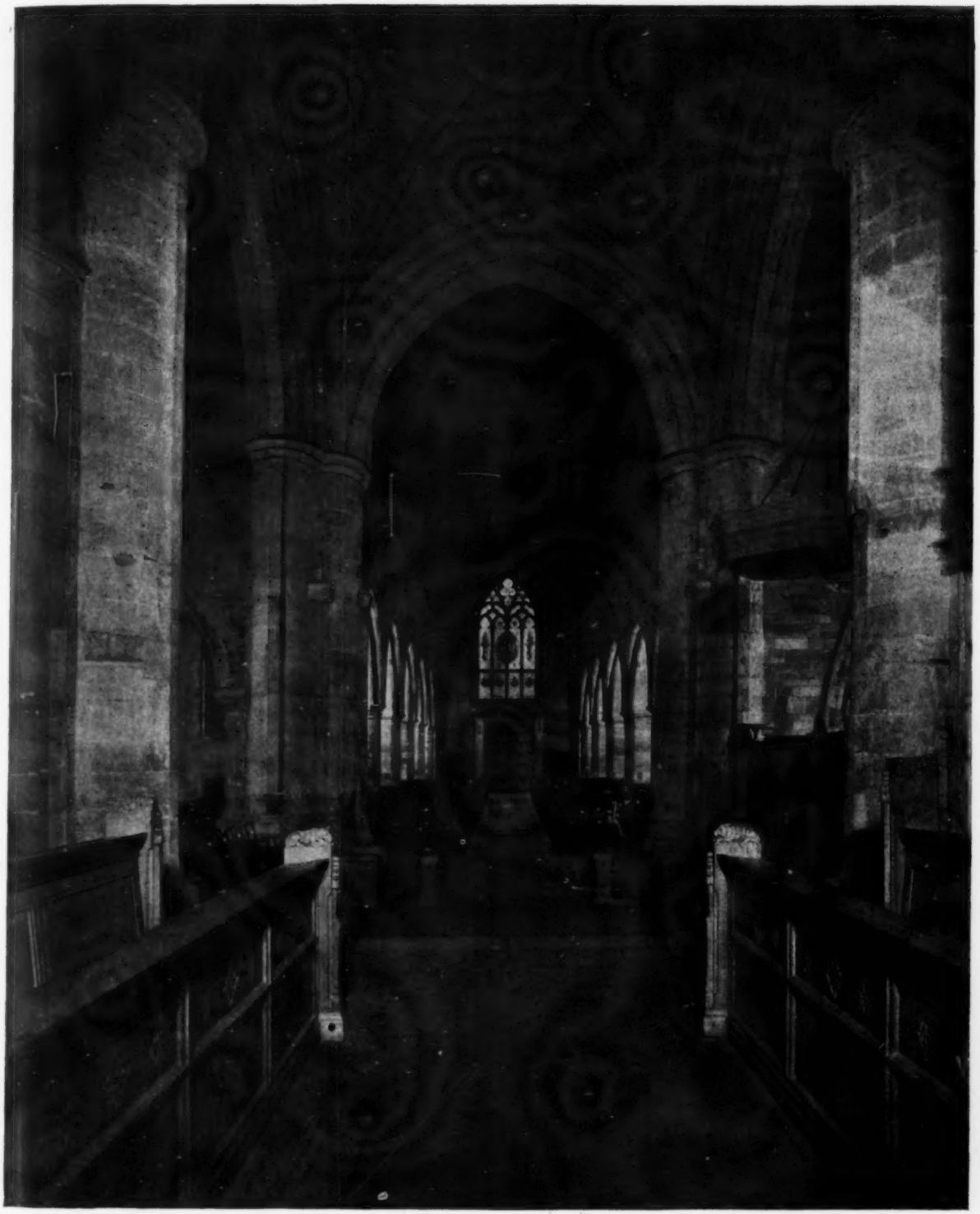

Perthshire War Memorial. Restoration of the Church of St. John, Perth: View Looking West, from Choir.

SIR ROBERT LORIMER, A.R.A., F.R.I.B.A., Architect.

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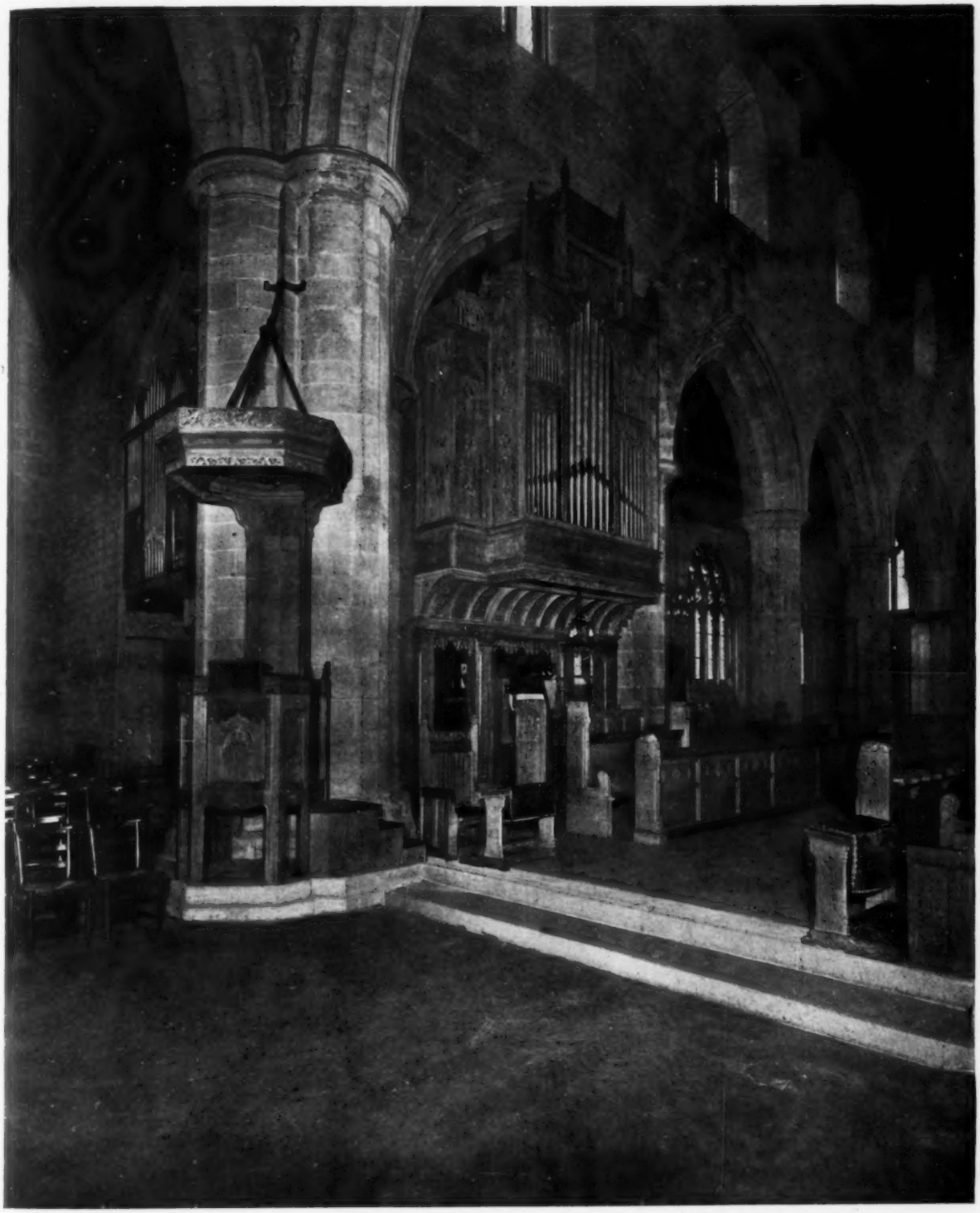

Perthshire War Memorial. Restoration of the Church of St. John, Perth: North Side of Choir.

SIR ROBERT LORIMER, A.R.A., F.R.I.B.A., Architect.

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Perthshire War Memorial. Restoration of the Church of St. John, Perth: The Shrine.

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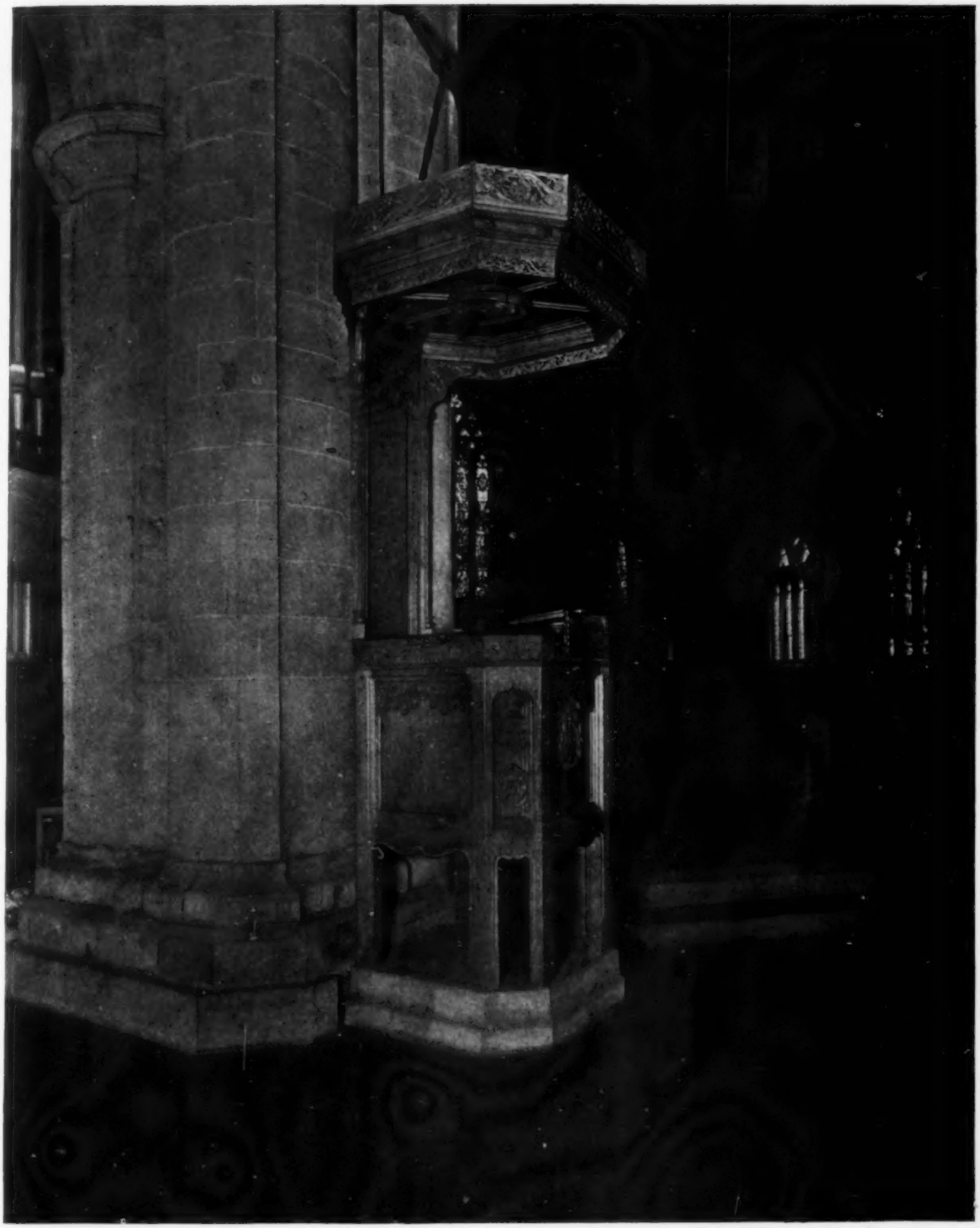

Perthshire War Memorial. Restoration of the Church of St. John, Perth: The Pulpit.

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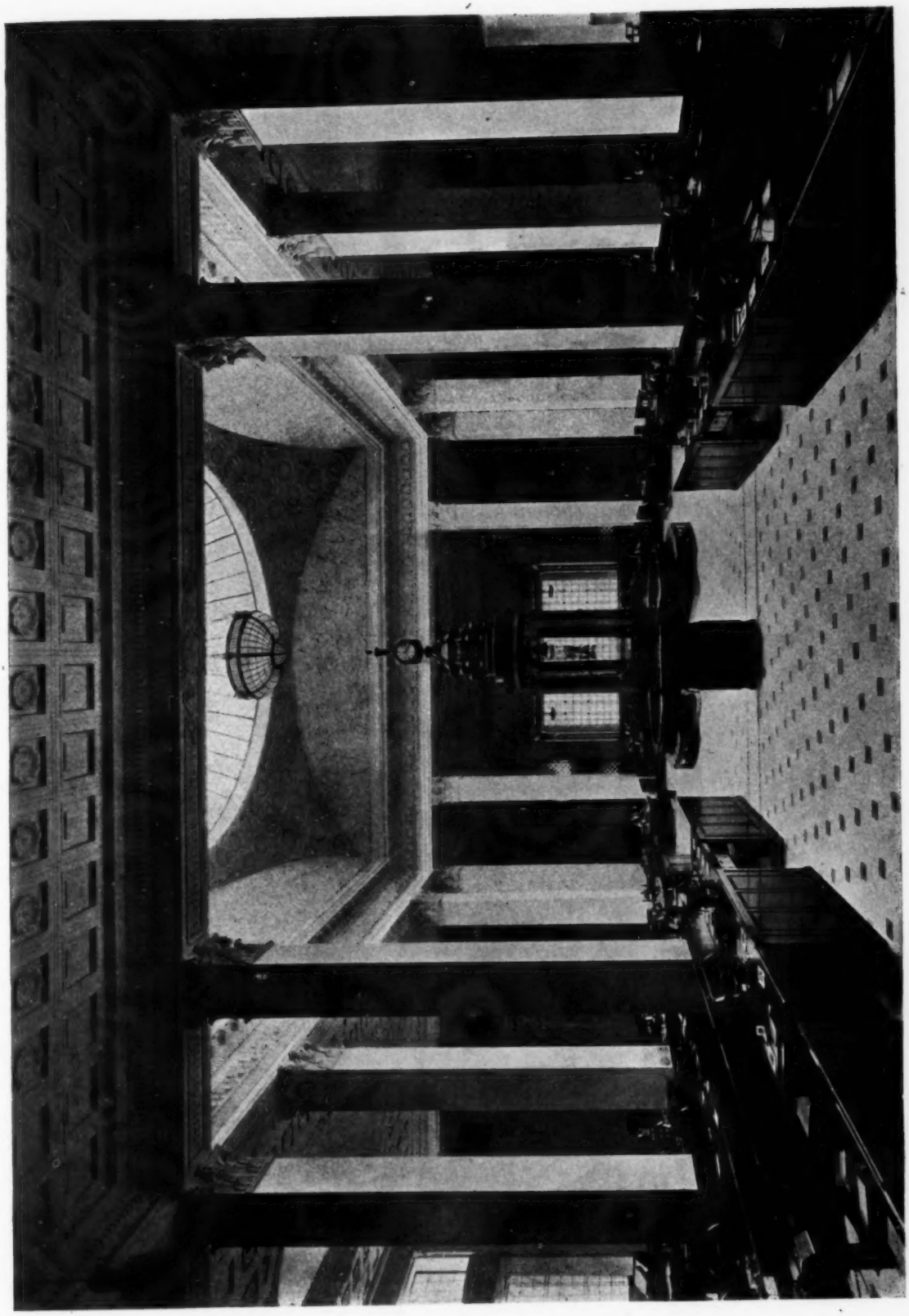

Photo: Humphrey Joel.

Lloyds, Leadenhall Street, E.C.: "The Room," showing the Crier's Rostrum.

SIR EDWIN COOPER, Architect.

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Lloyds, Leadenhall Street, E.C.: The Rostrum, showing the Lutine Bell.

SIR EDWIN COOPER, Architect.

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Lloyds, Leadenhall Street, E.C.: The Library.
SIR EDWIN COOPER, Architect.

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Lloyds, Leadenhall Street, E.C.: The Smoke Room.
SIR EDWIN COOPER, Architect.

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Detail of Entrance, Lime-street.

Brokers' Entrance, Lime-street.

Lloyds, Leadenhall Street, E.C.

Sir Edwin Cooper, Architect.

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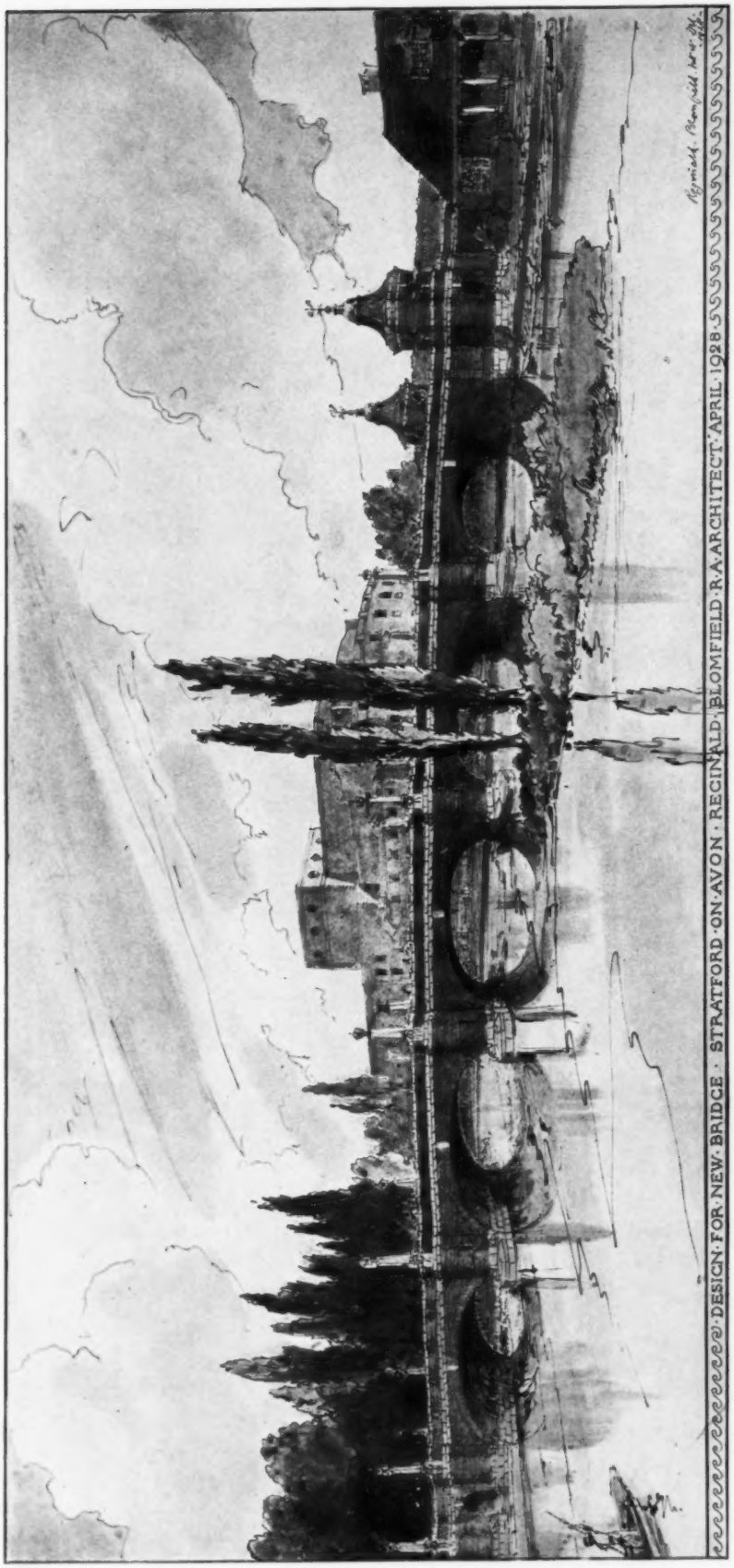

This view shows Sir Reginald Blomfield's design for the proposed new Bridge at Stratford-on-Avon in relation to the Shakespeare Memorial Theatre, which is to be erected from the designs of Miss Elisabeth Scott.

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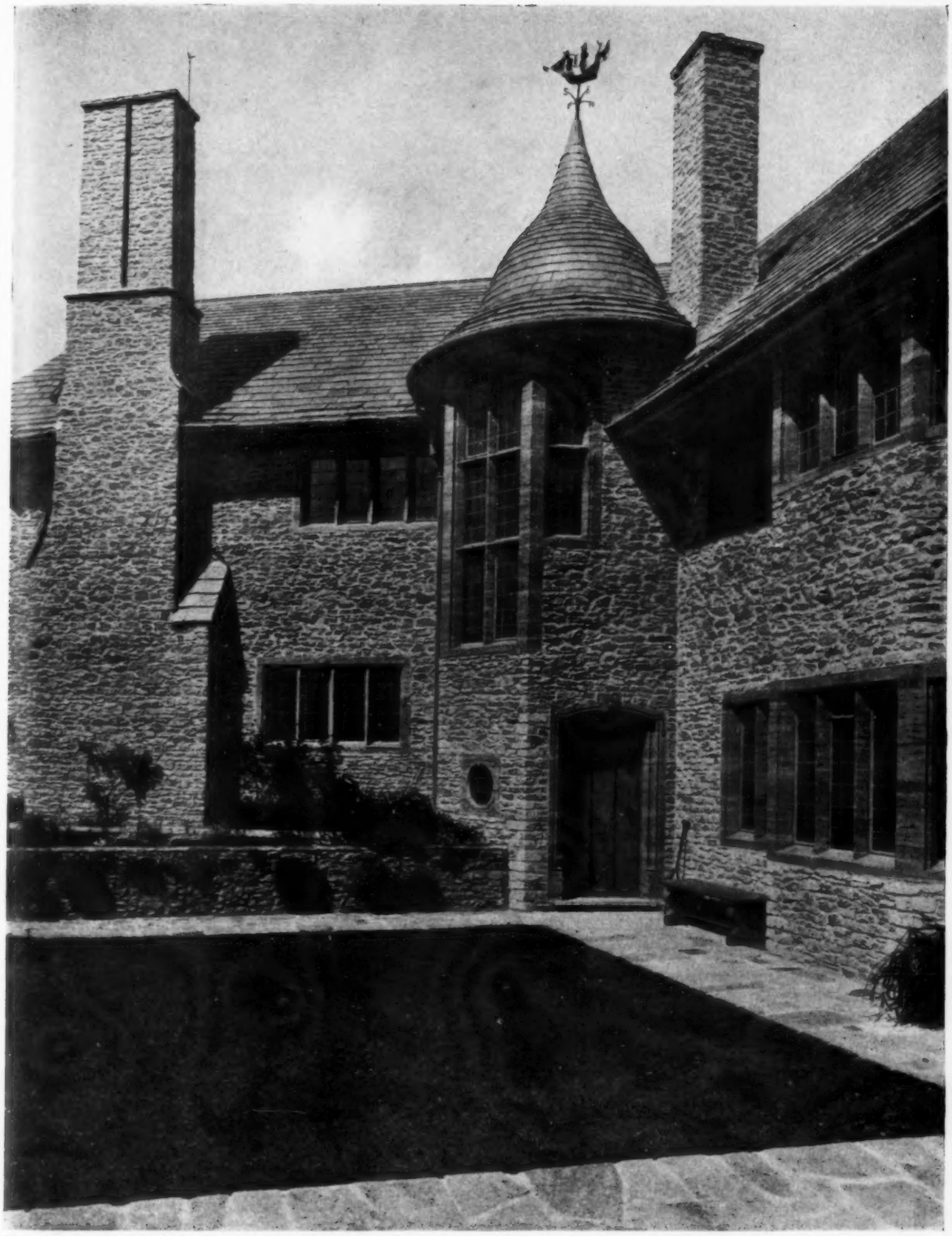

Photo: Humphrey and Vera Joel.

"Ashley Chase," near Abbotsbury, Dorset: Staircase Turret and South-West Corner.

MR. E. GUY DAWBER, A.R.A., P.P.R.I.B.A., Architect.

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Photo: Humphrey and Vera Joel.

"Ashley Chase," near Abbotsbury, Dorset: General View from North-West.

MR. E. GUY DAWBER, A.R.A., P.P.R.I.B.A., Architect.

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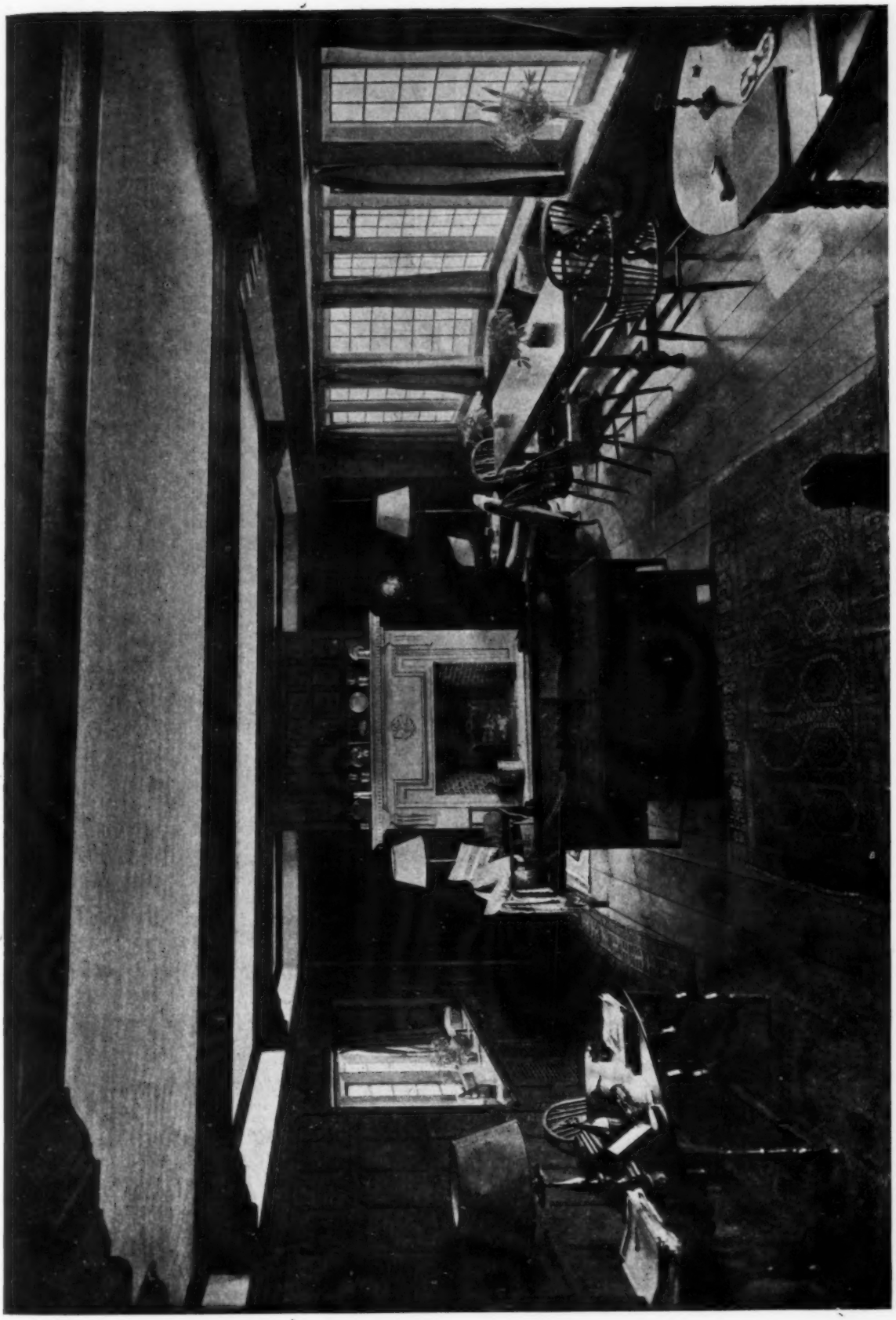

"Ashley Chase," near Abbotsbury, Dorset: View of Hall from Stairway Passage.

Mr. E. Guy Dawber, A.R.A., P.P.R.I.B.A., Architect.

Photo: Humphrey and Vera Joel.

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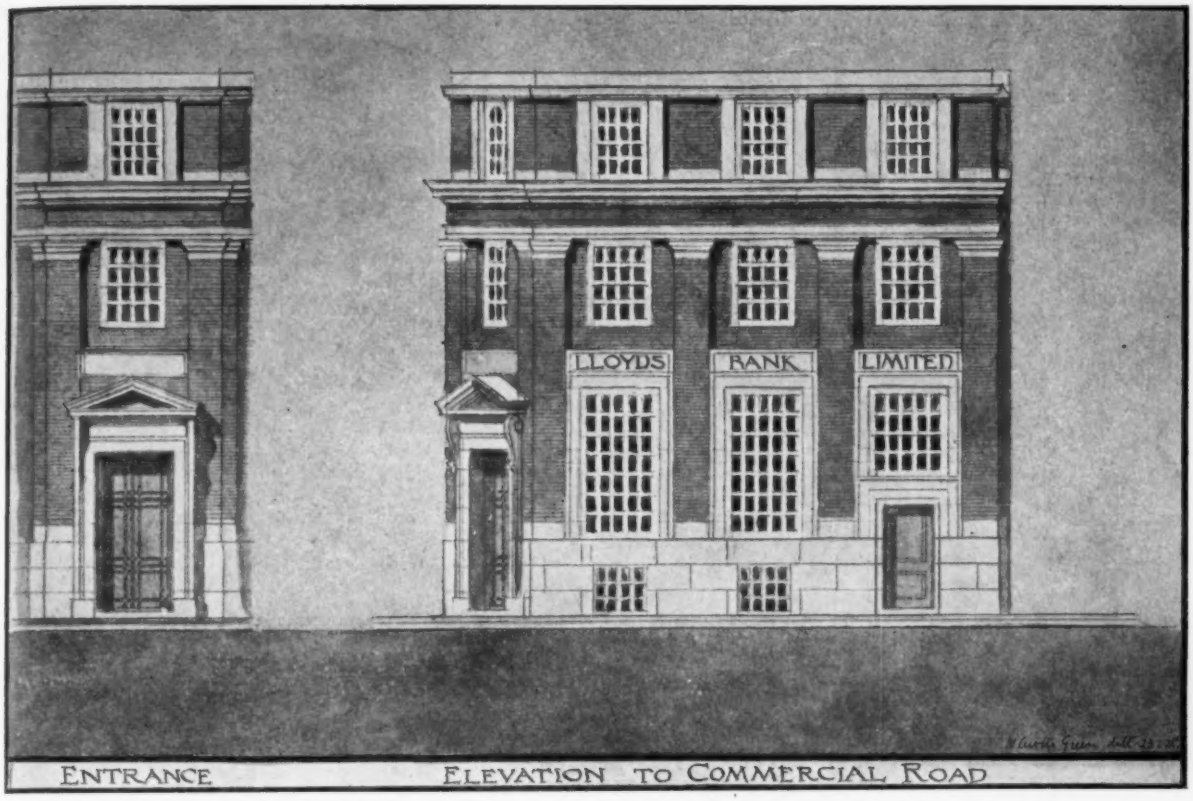
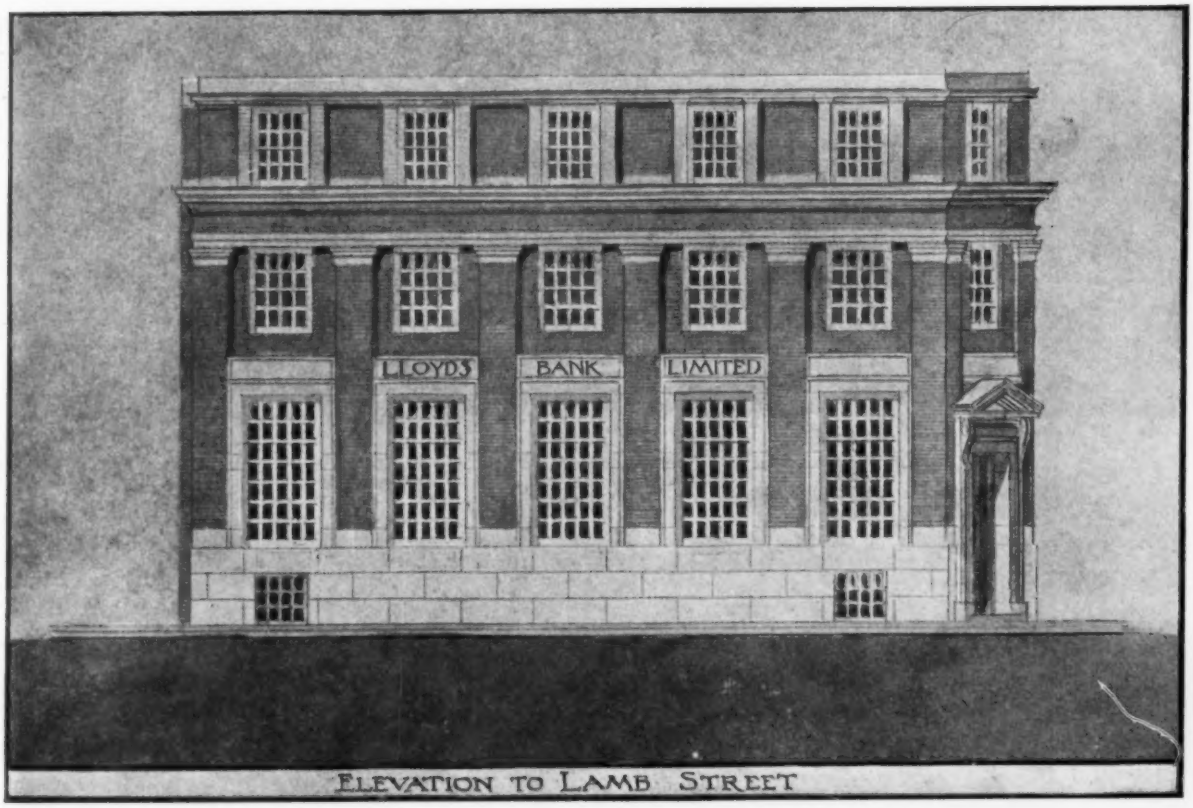


ENTRANCE ELEVATION TO COMMERCIAL ROAD



ELEVATION TO LAMB STREET

Lloyds Bank, Spitalfields.

MESSRS. W. CURTIS GREEN, A.R.A., & PARTNERS, Architects.

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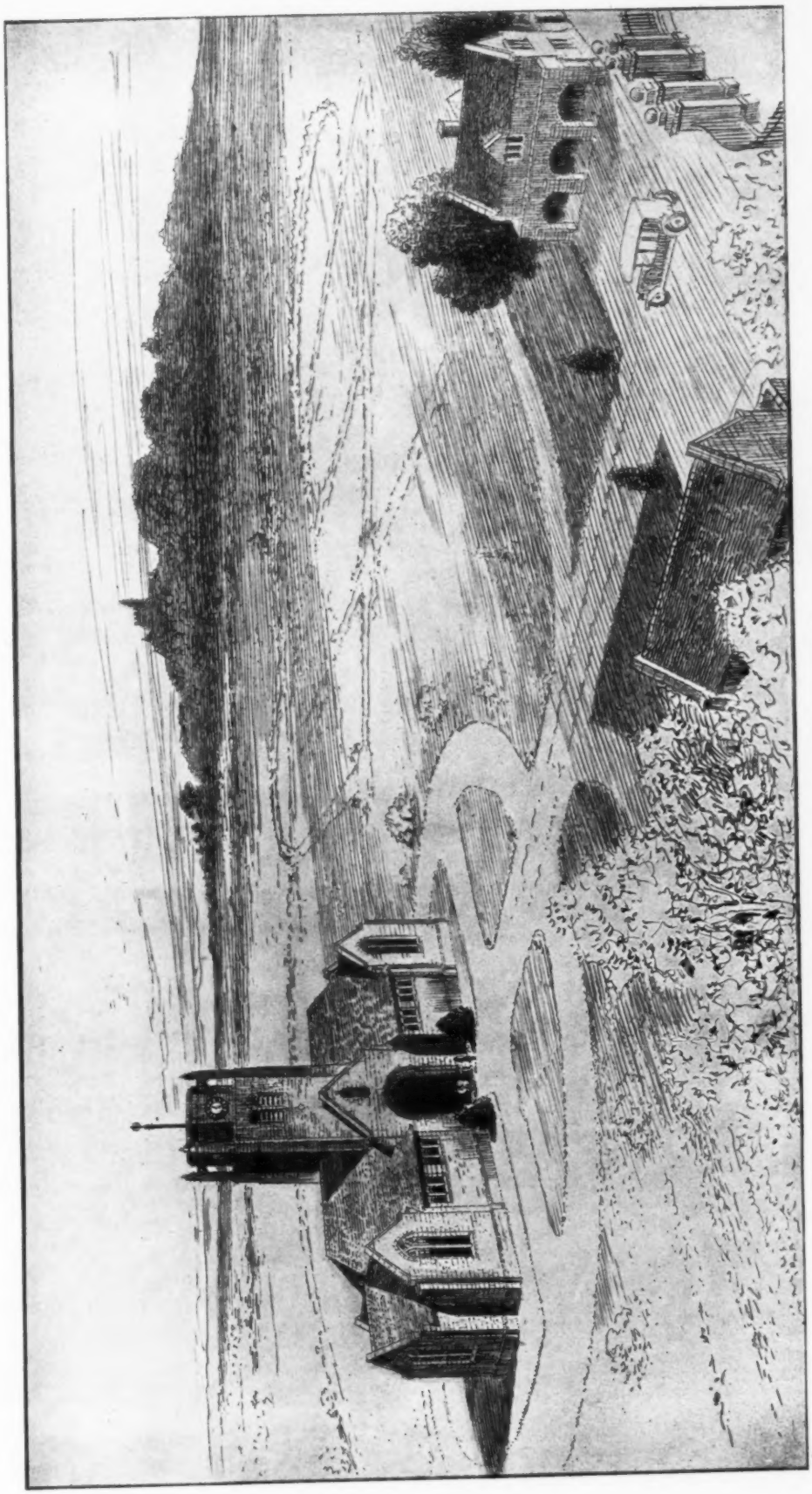

New Cemetery Chapels and Lodges for the Camberwell Borough Council.

Sir Aston Webb & Son, Architects.

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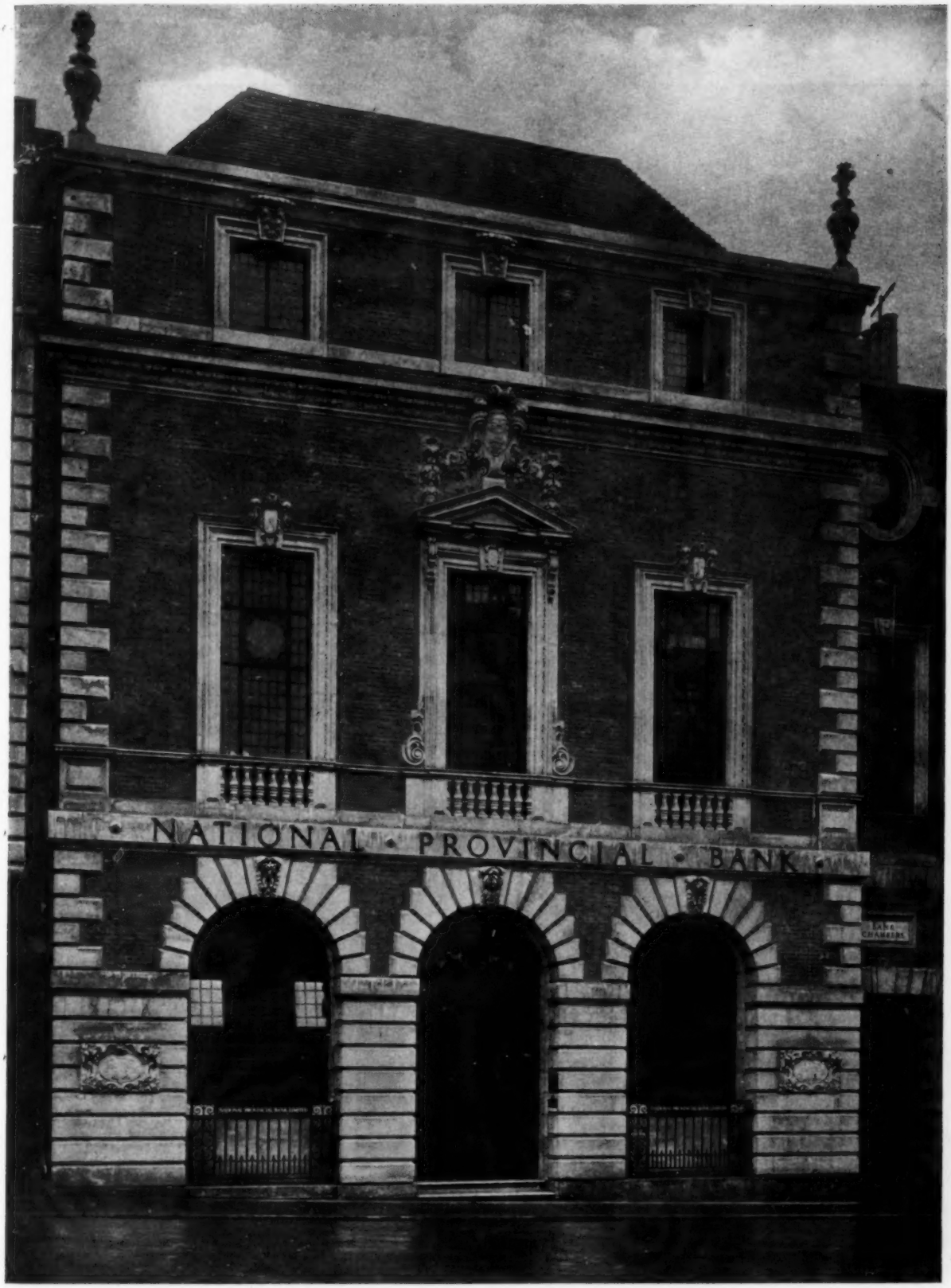

National Provincial Bank, Shrewsbury.

MESSRS. F. C. R. PALMER and W. F. C. HOLDEN, FF.R.I.B.A., Architects.

National Provincial Bank, Shrewsbury: Banking Hall.

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National Provincial Bank, Leatherhead.

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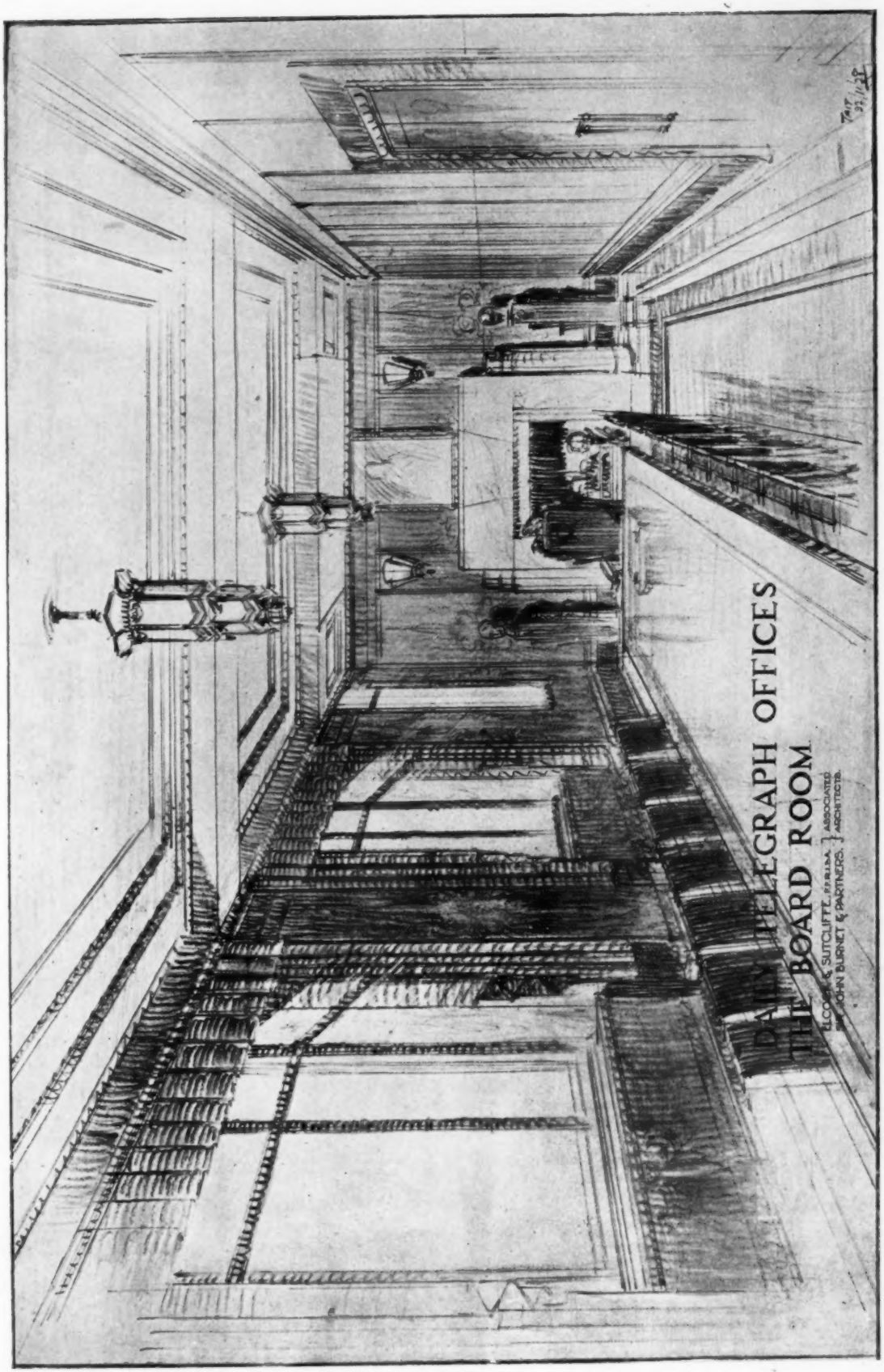
"The Daily Telegraph" New Building, Fleet Street, E.C.

MESSRS. ELCOCK & SUTCLIFFE, FF.R.I.B.A., and SIR JOHN BURNET AND PARTNERS, Associated Architects.



"The Daily Telegraph" New Building, Fleet Street, E.C.: Board Room.

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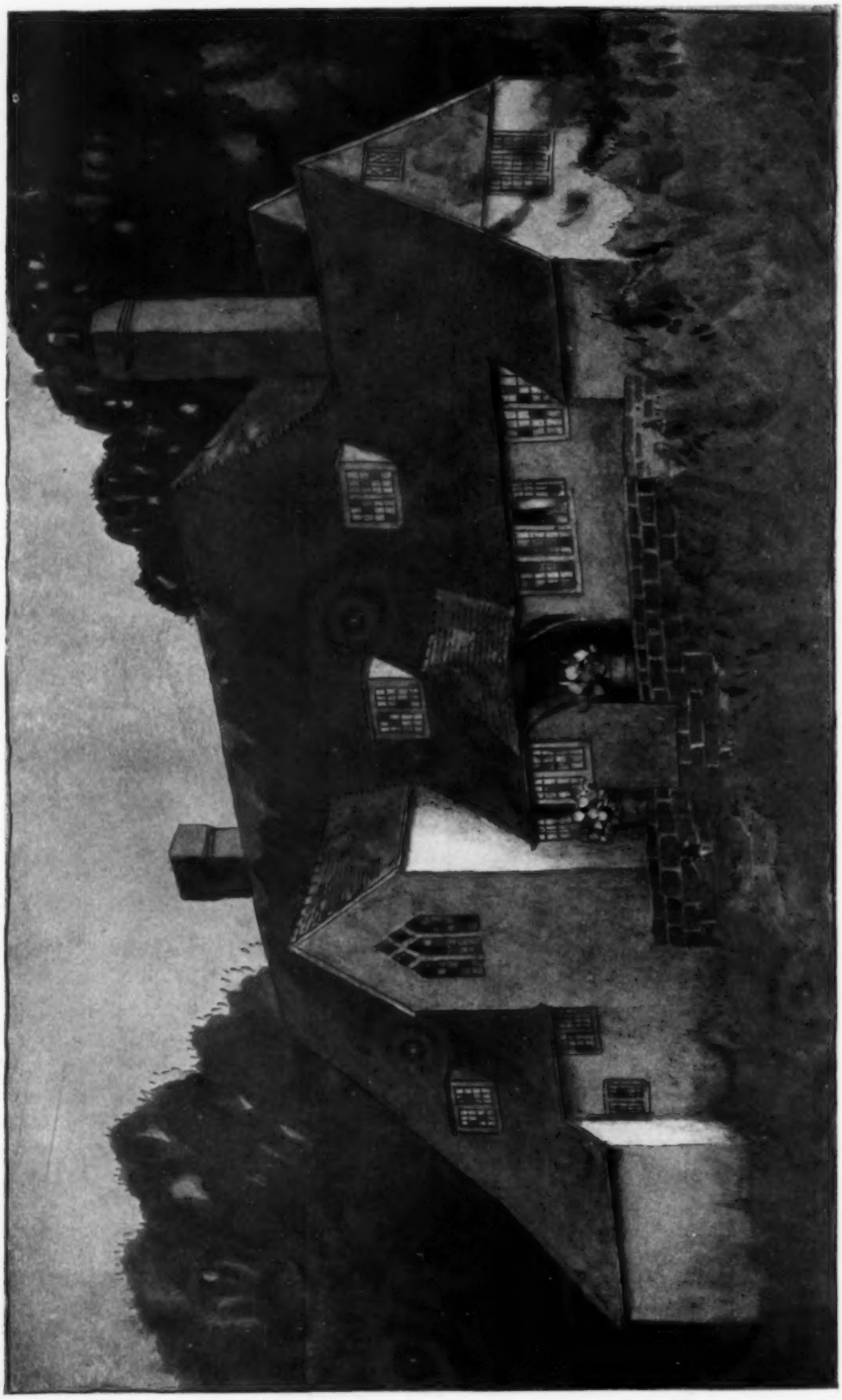
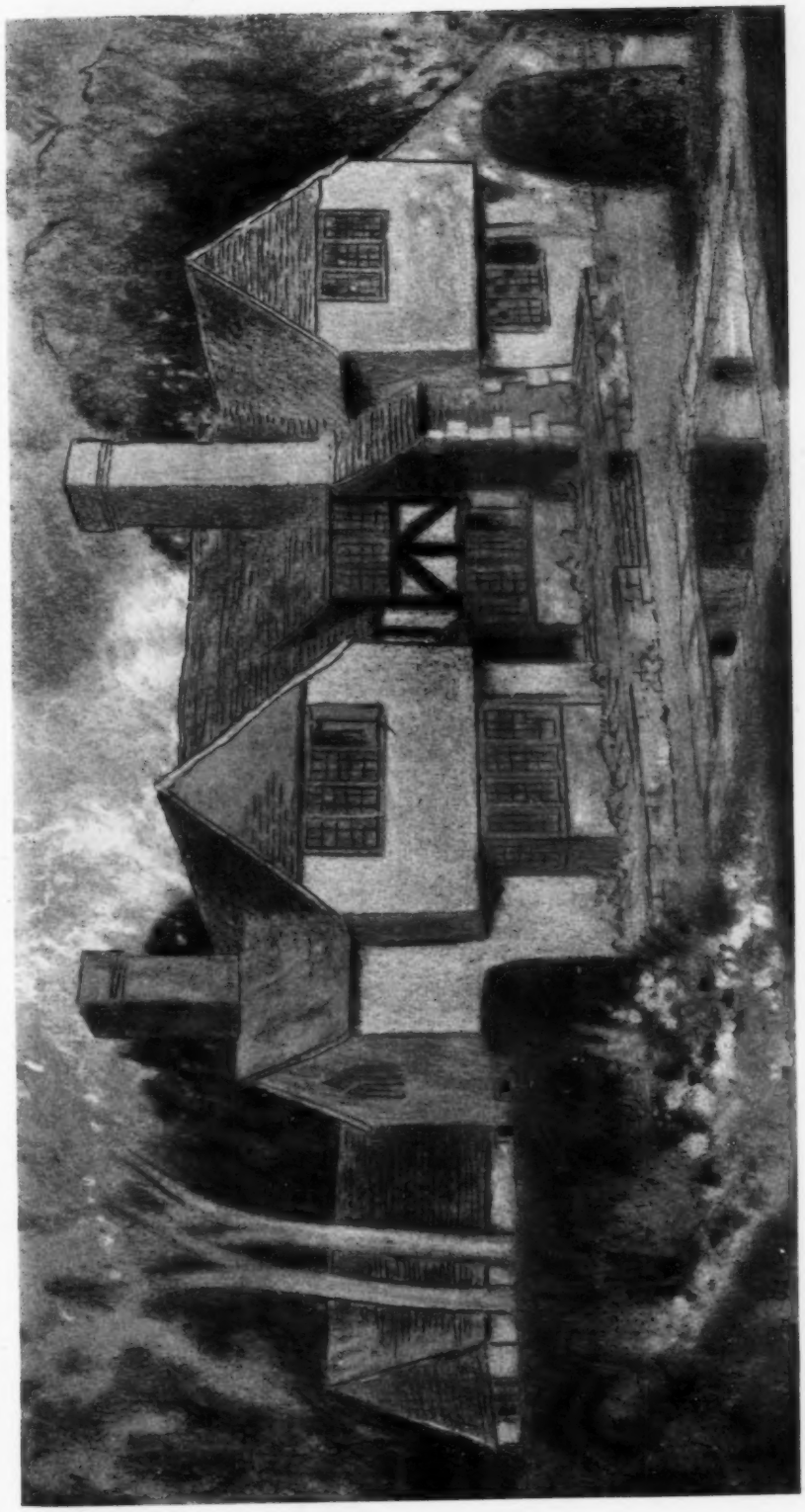
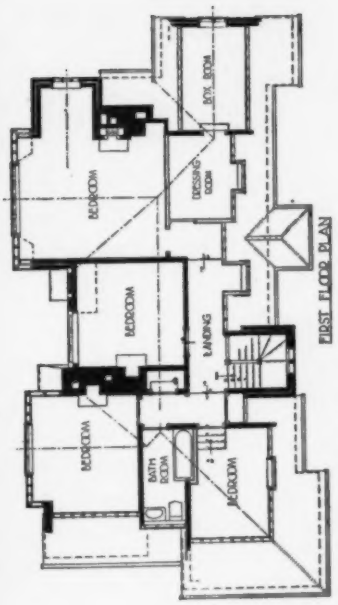


House in Wilderness Avenue, Sevenoaks, Kent: Entrance Front.

MESSRS. BAILLIE SCOTT & BERESFORD, Architects.





House in Wilderness Avenue, Sevenoaks, Kent: Garden Front.

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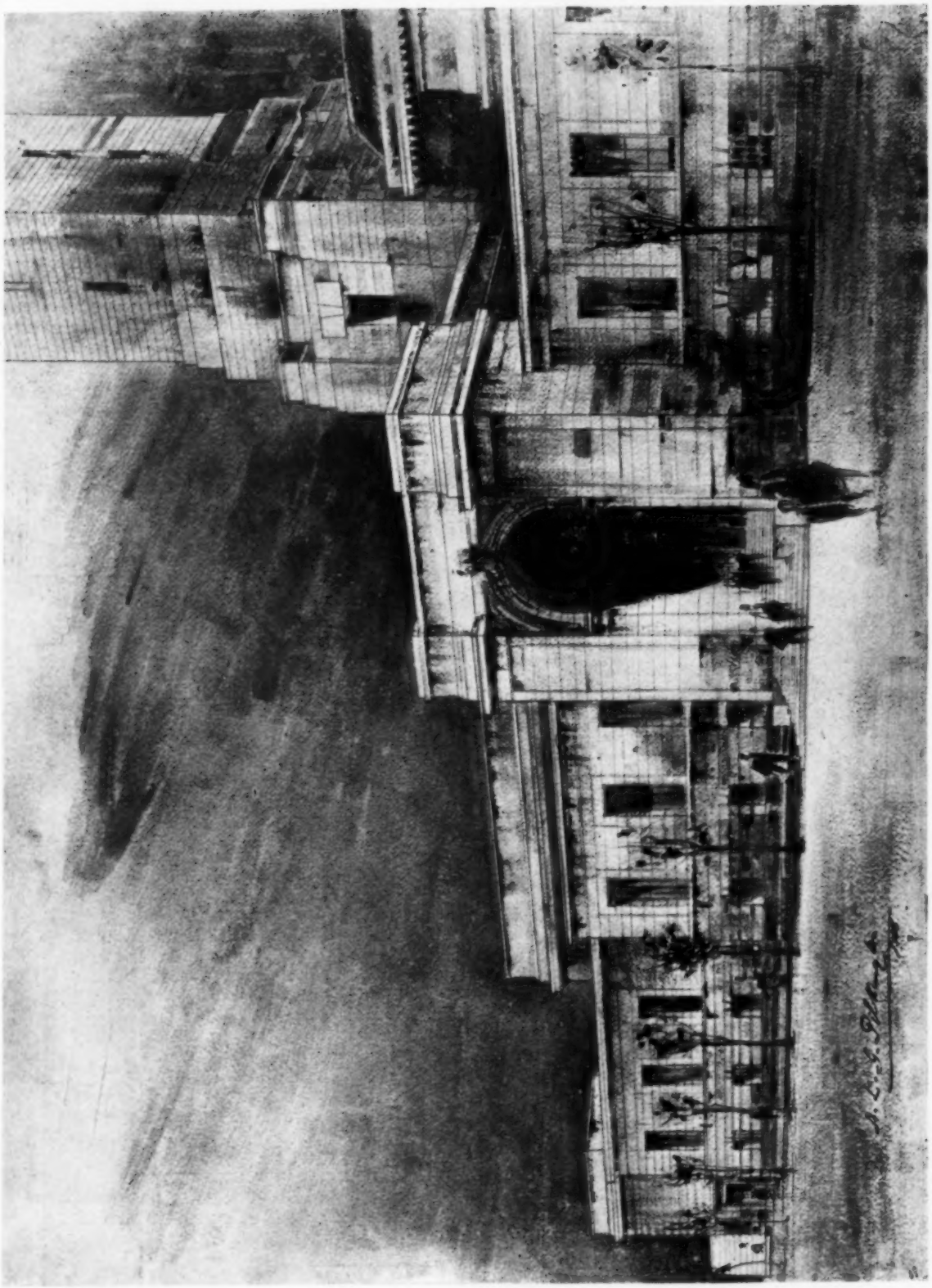
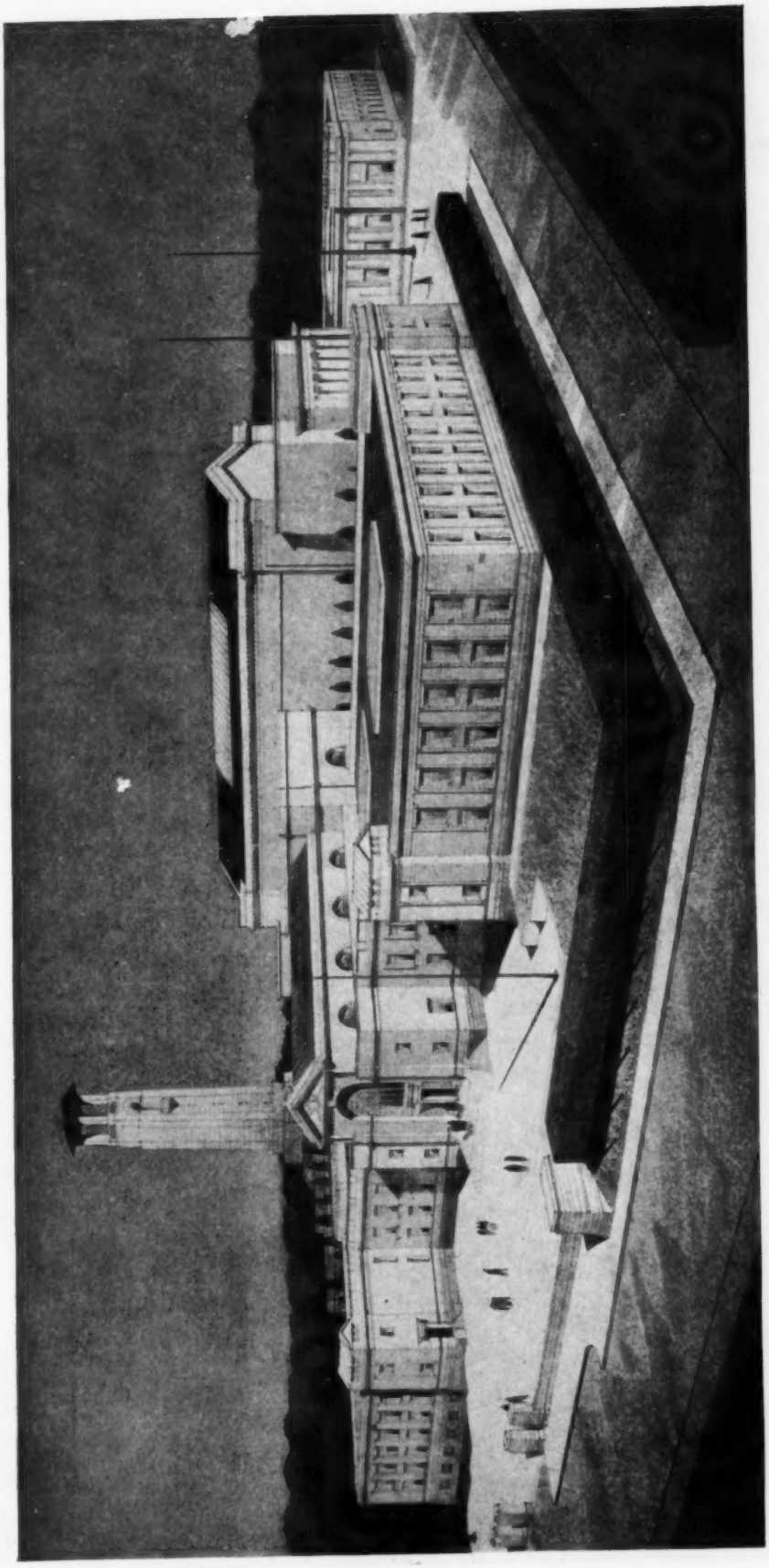


Southampton Civic Centre: Entrance to Police Courts, &c.

MR. E. BERRY WEBBER, A.R.I.B.A., Architect.



Southampton Civic Centre: Bird's-eye view of Whole Scheme, from South-East.

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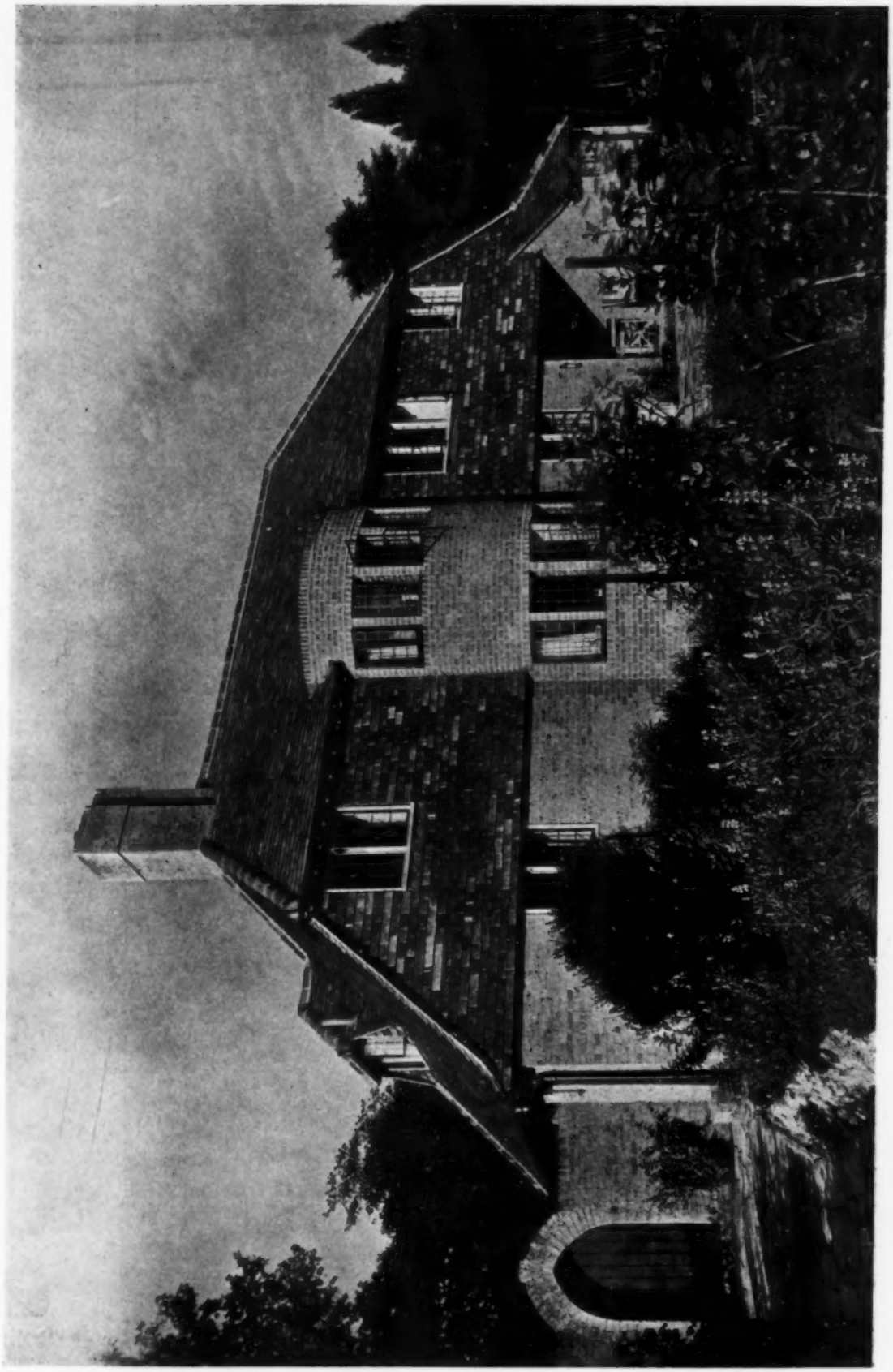


"Skaill," South Hill Avenue, Harrow-on-the-Hill.

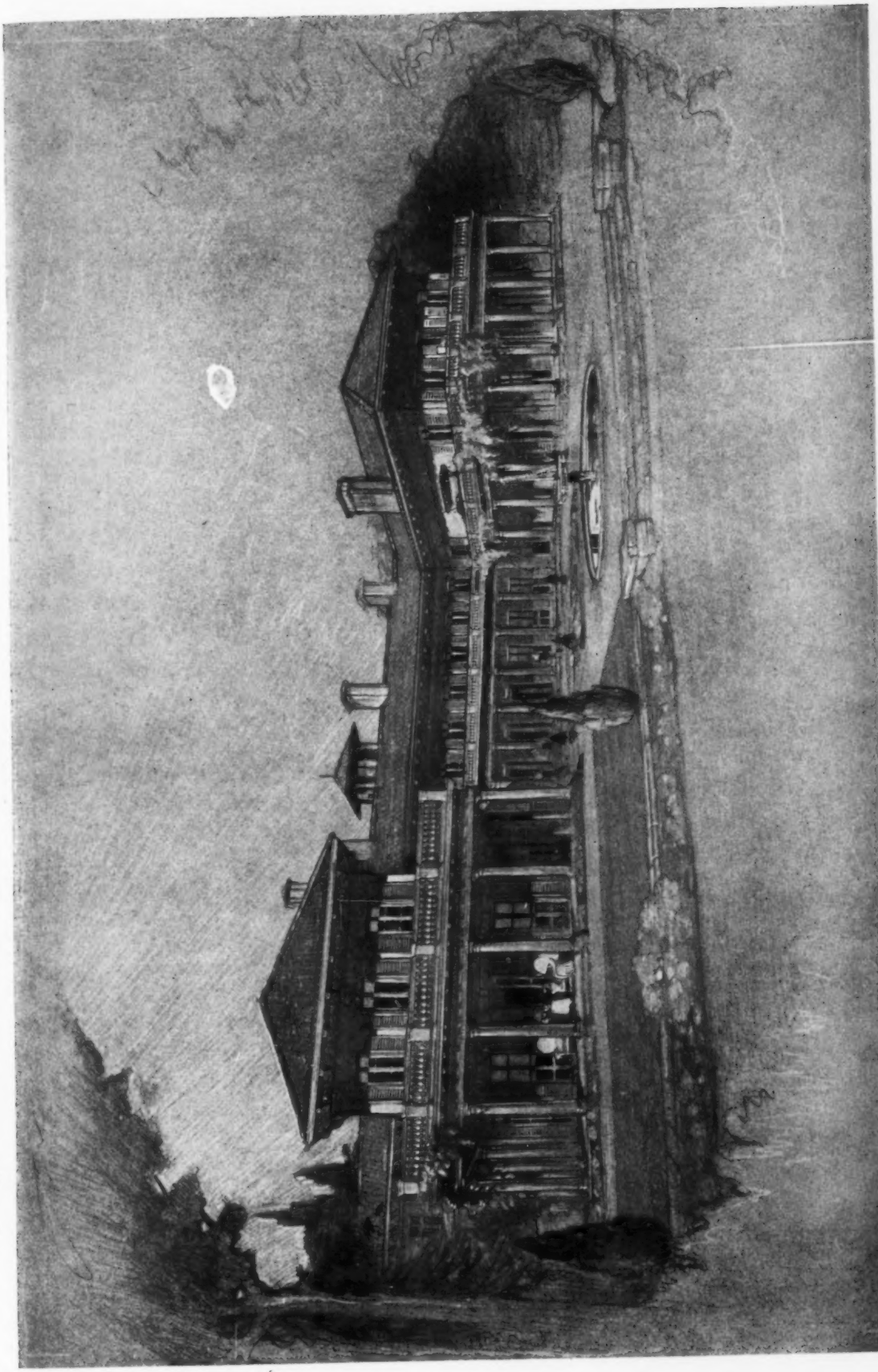
MR. A. PERCIVAL STARKEY, Architect.

King William Street House, E.C.

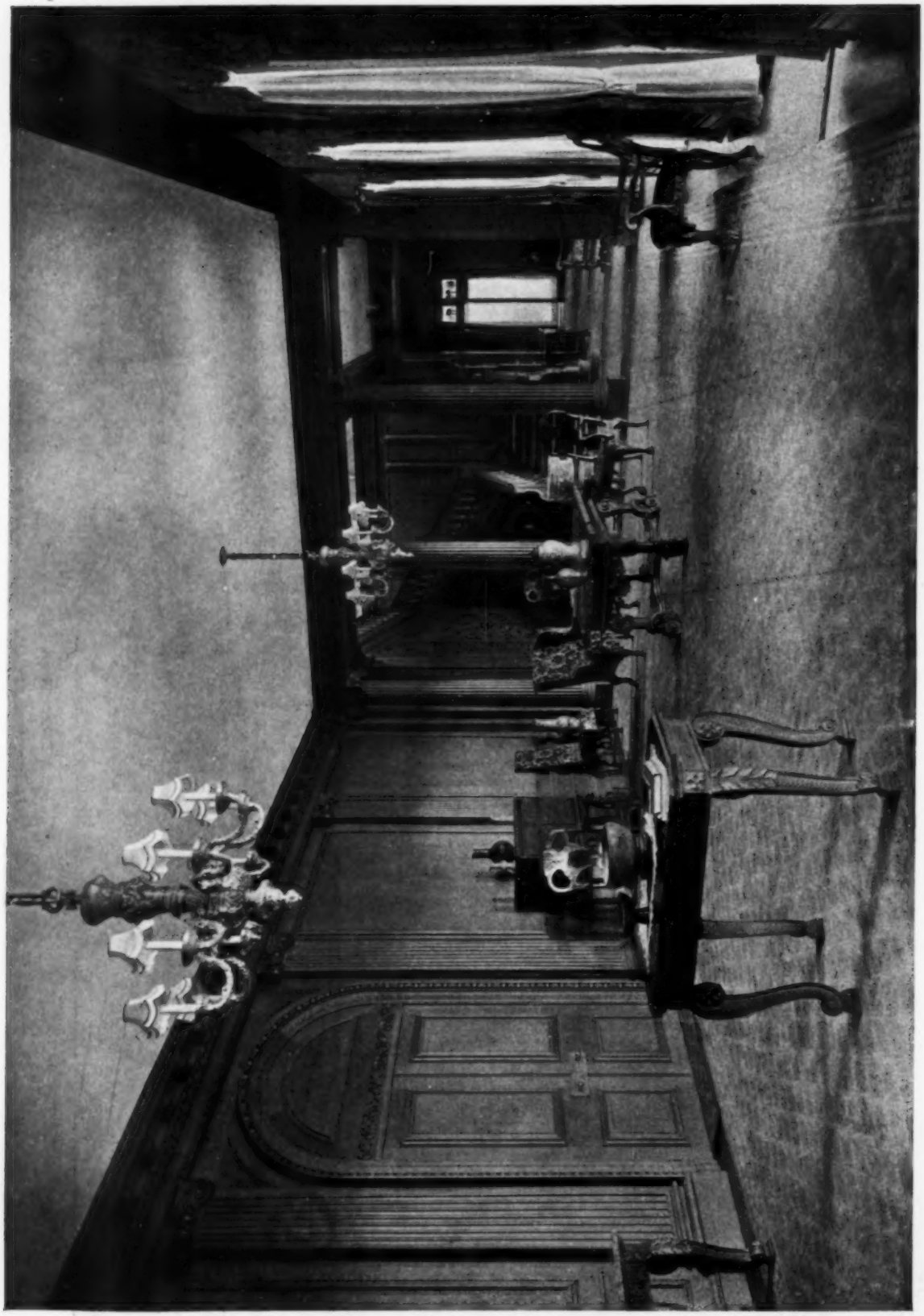
MESSRS. GUNTON & GUNTON, FF.R.I.B.A., Architects.

"Thanet Place," Broadstairs: Detail of Entrance Front.

MR. EDGAR RANGER, Architect, in collaboration with SIR CHARLES C. ALLOM.

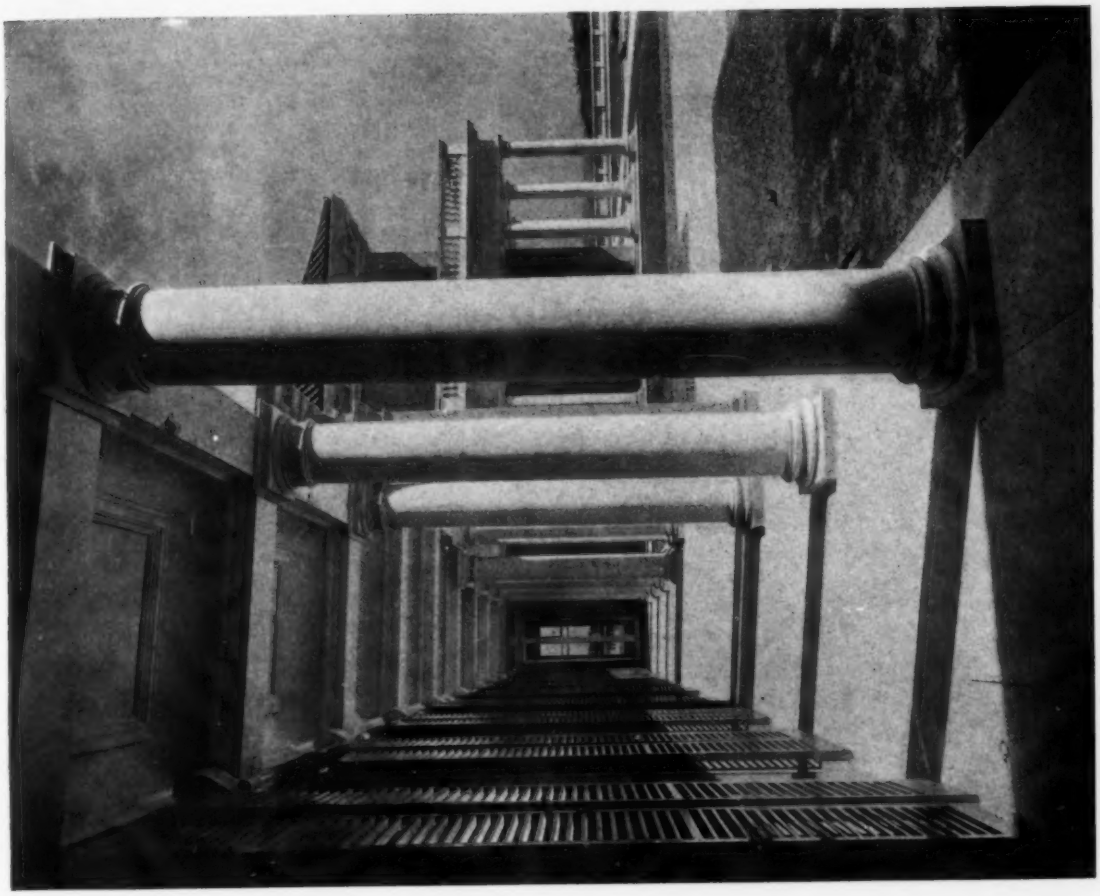


"Thanet Place," Broadstairs.
From a drawing by SIR CHARLES C. ALLOM.
MR. EDGAR RANGER, Architect, in collaboration with SIR CHARLES C. ALLOM.



"Thanet Place," Broadstairs: Lounge Hall and Staircase.

Mr. Edgar Ranger, Architect, in collaboration with Sir Charles C. Allom.

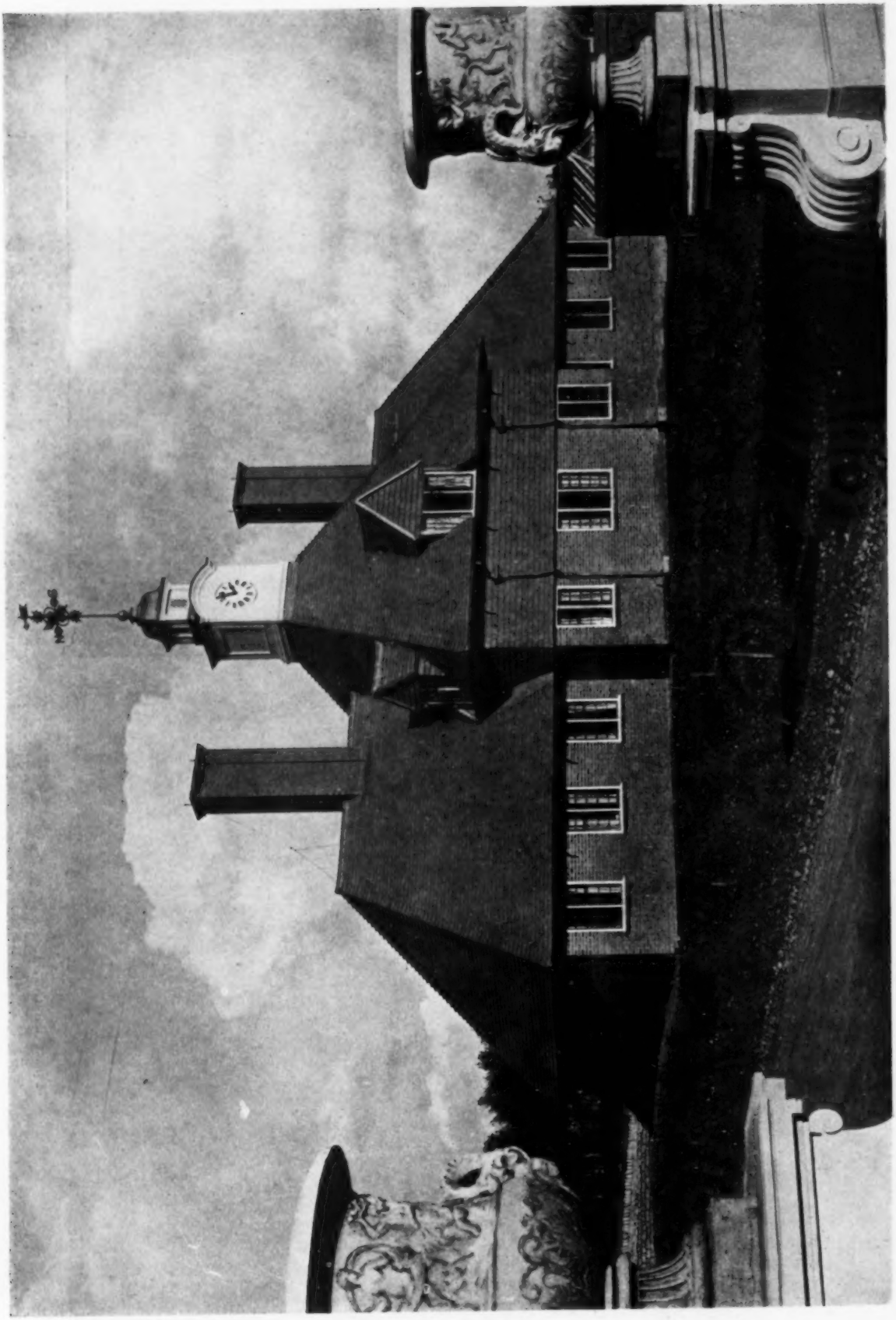


DETAIL OF COLONNADE.

TERRACE PAVILION.

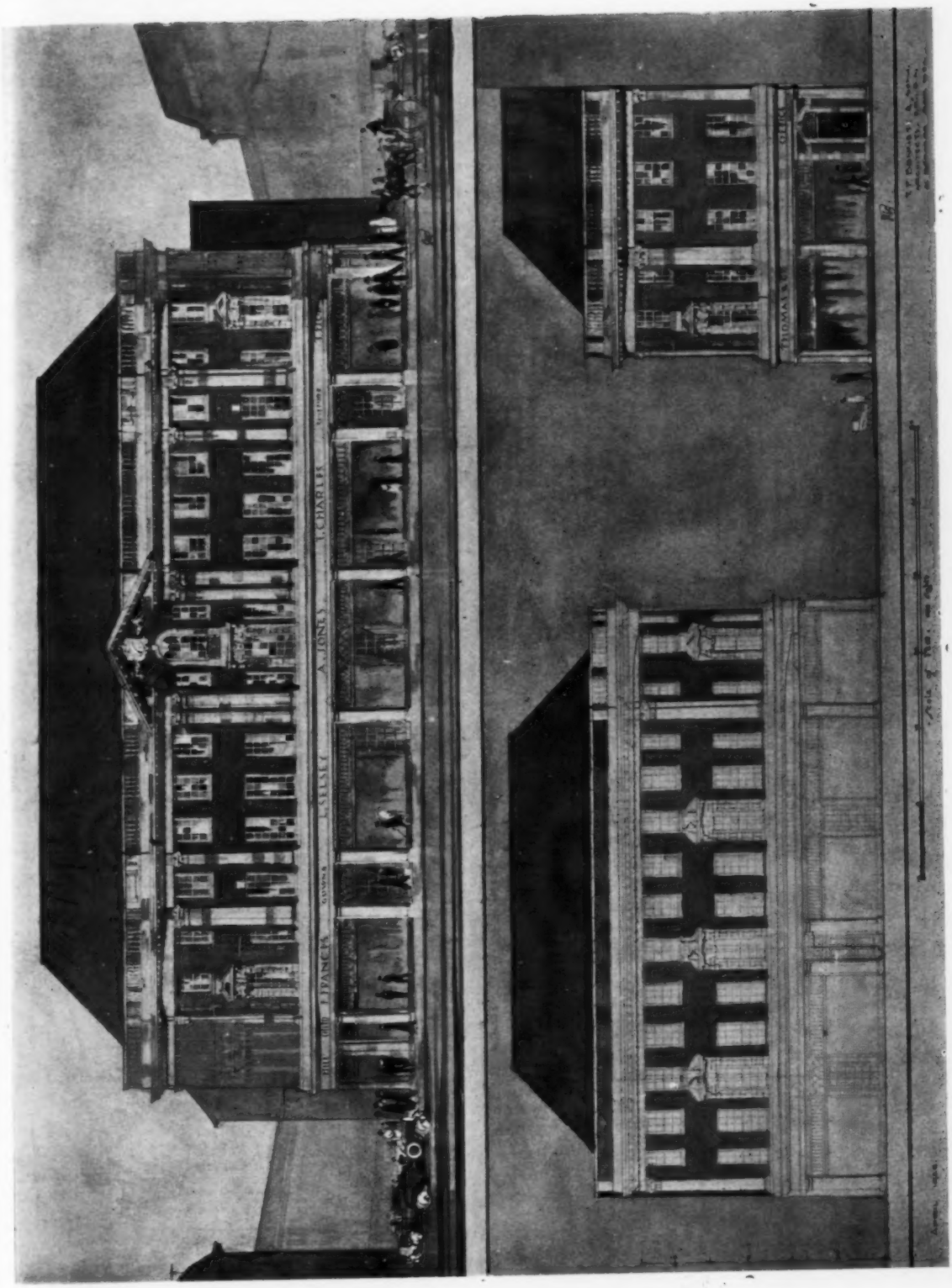
"THANET PLACE," BROADSTAIRS.

MR. EDGAR RANGER, Architect, in collaboration with SIR CHARLES C. ALLOM.



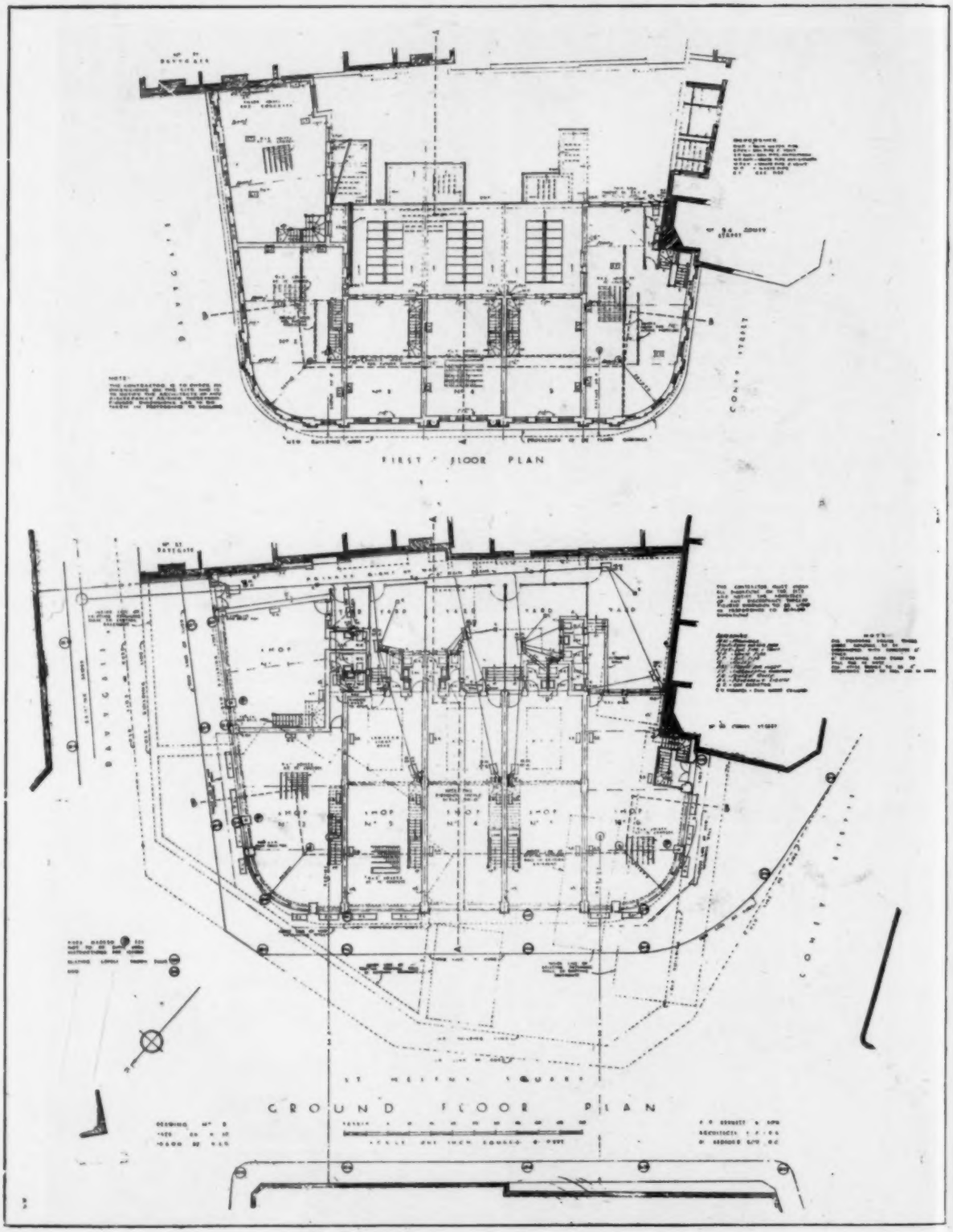
"Thanet Place," Broadstairs: Garage Building.

MR. EDGAR RAWORTH, Architect, in collaboration with SIR CHARLES C. ALLOM.



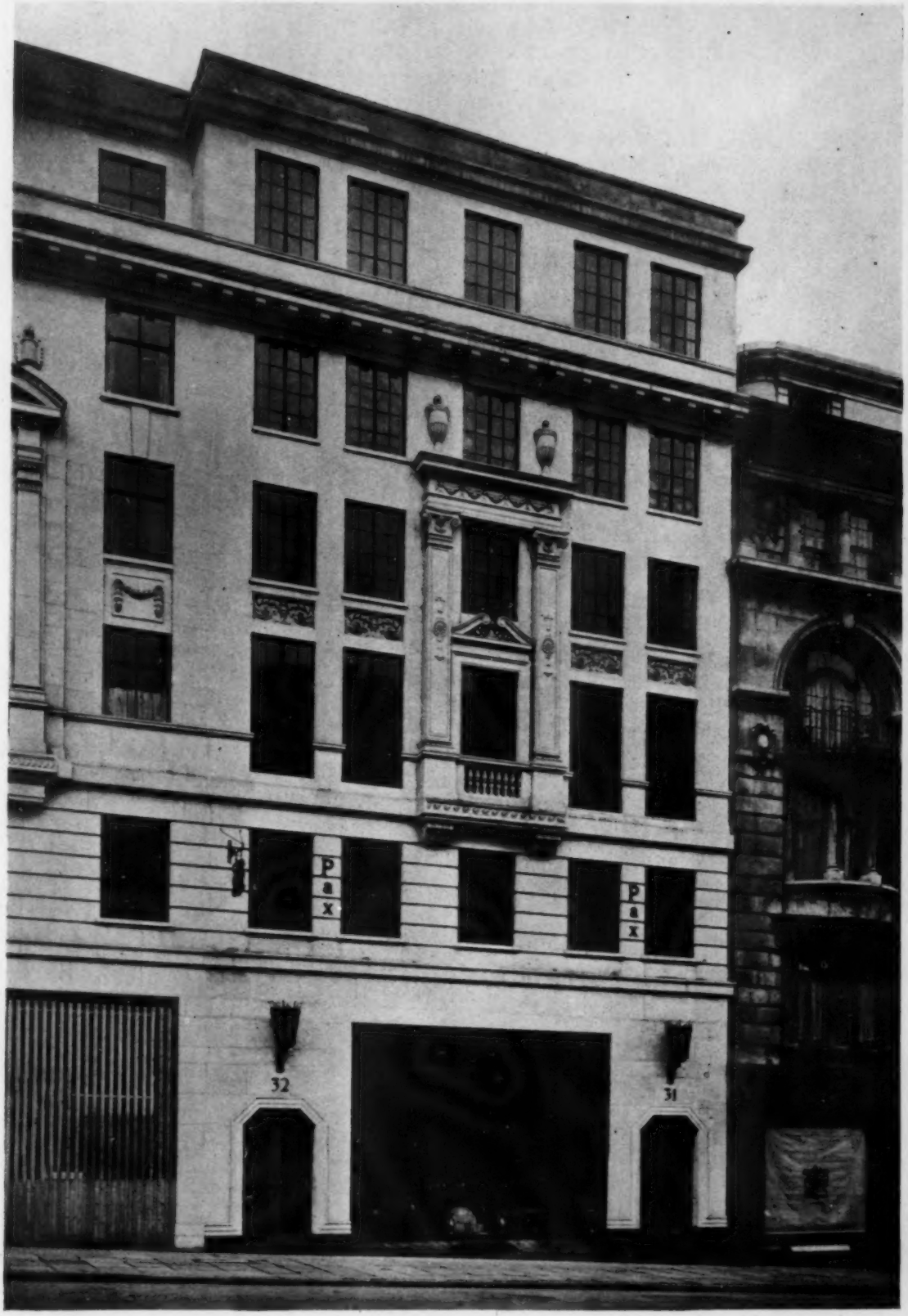
Shops and Offices, St. Helen's Square, York.
MESSRS. T. P. BENNETT & SON, Architects.

MR. EDGAR RANGER, Architect, in collaboration with SIR CHARLES C. ALLOM.



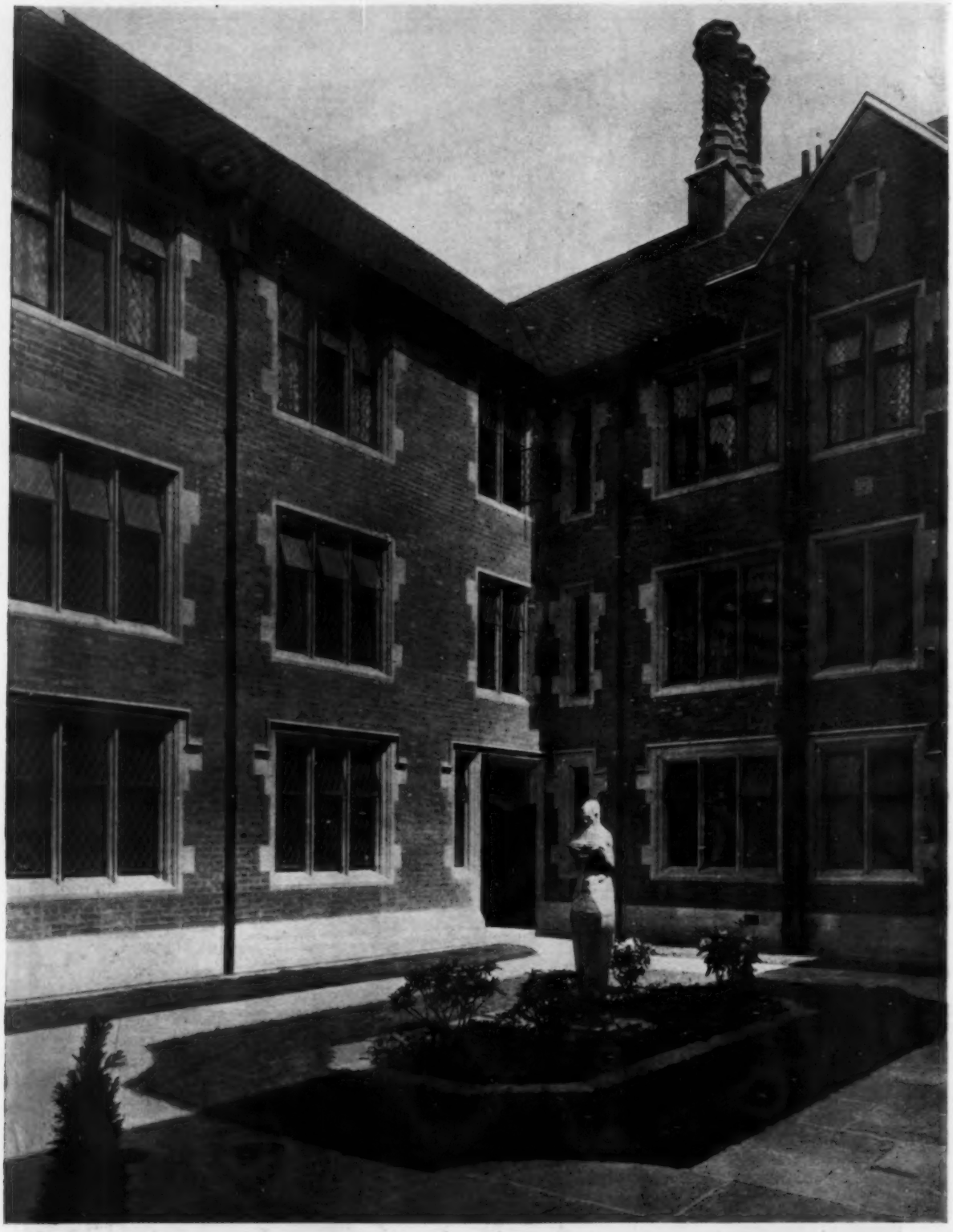
Shops and Offices, St. Helen's Square, York.

MESSRS. T. P. BENNETT & SON, Architects.

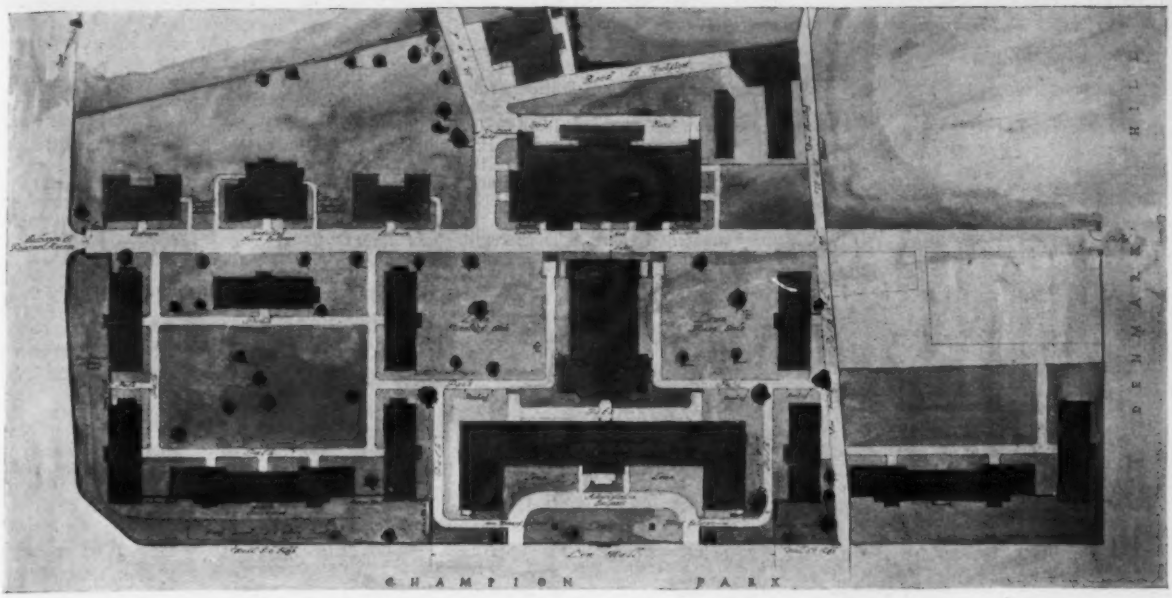


New Premises, St. James's Street, W.

MESSRS. YATES, COOK & DARBYSHIRE, Architects.



"Church Close," Church Street, Kensington.
MESSRS. YATES, COOK & DARBYSHIRE, Architects.



William Booth Memorial Buildings, Denmark Hill: Lay-out Plan.

MESSRS. ALEXANDER GORDON and G. J. MORRIS VINER, LL.R.I.B.A., and SIR GILES GILBERT SCOTT, R.A., F.R.I.B.A., Associated Architects.

New South London Store, Brixton Road, S.W.

MESSRS. H. PAYNE WYATT, SON & PARTNER, Architects.

ILLUSTRATIONS

PLATES

"The Builder" Calendar, 1929.

The subject of our Calendar is a view of Waterloo Bridge from the south side, drawn by Mr. Joseph Pike. Facilities for the making of this drawing were kindly afforded by Messrs. Walkers, Parker & Co., Ltd., lead manufacturers.

National Provincial Bank, Princes-street, E.C.

These new premises are now in course of erection. The architect is Sir Edwin Cooper, and the builders are Messrs. John Mowlem and Co.

Royal Mail Steam Packet Co.'s Head Building.

This building is now nearing completion, and at a later date, on the occasion of the opening, we hope to illustrate it fully from photographs and drawings by Mr. Raffles Davison. The architect is Sir Edwin Cooper, and the general contractors Messrs. Trollope and Colls.

William Booth Memorial Buildings, Denmark Hill.

These buildings, now approaching completion, are being erected for the purpose of housing and training Salvation Army officers, and are planned to accommodate 350 women students and 250 men students. The buildings are situated in Champion Park, Camberwell, S.E., opposite Denmark Hill Station, having a frontage to Champion Park of about 800 ft. and a return frontage to Grove-lane of 400 ft.; they cover, altogether, an area of approximately 7½ acres. The scheme consists of a group of buildings which may be broadly divided into three sections, residential, educational and administrative.

The residential buildings consist of 12 housing blocks or hostels, four stories high, grouped round large quadrangles, and are placed at either end of the site, one group being for the men students and the other for the women. Each of these hostels contains bedroom accommodation for 50, with day-room, cloakroom and other offices. The dining-halls, with kitchen, etc., form a separate block or unit, and are placed on the main central axis.

The educational section, comprising class-rooms, etc., is placed in the centre building, on the main front; this block also contains the administrative offices. An assembly hall, to seat 1,000 persons, is placed immediately behind this centre block. Small units, such as hospitals, hydropathic departments, boiler house, workshop, etc., are arranged in various positions at the back of the site.

The buildings are faced with multi-coloured 2-in. bricks, with wide joints, with some Travertine stone dressings and sills. The roofs are flat pitched and covered with small dun-coloured Lombardic tiles. The windows are metal casements throughout. The style of the buildings is a modern rendering of Gothic, though it by no means slavishly follows the traditional characteristics of that style; for example, the pointed arch is conspicuous by its absence. In no way has the style been allowed to hamper the free use of any modern methods of construction or planning.

The general contractors are Messrs. Grigg & Sons, and the following are sub-contractors:—London and Wales Steel Construction Co., steel and ferro-concrete; Ames & Finnis, bricks and tiles; the Brunswick Metal Casement and Engineering Co., metal casements; Carter & Co., tiling and terrazzo; Evans & Son, composition flooring; J. Smith & Son,

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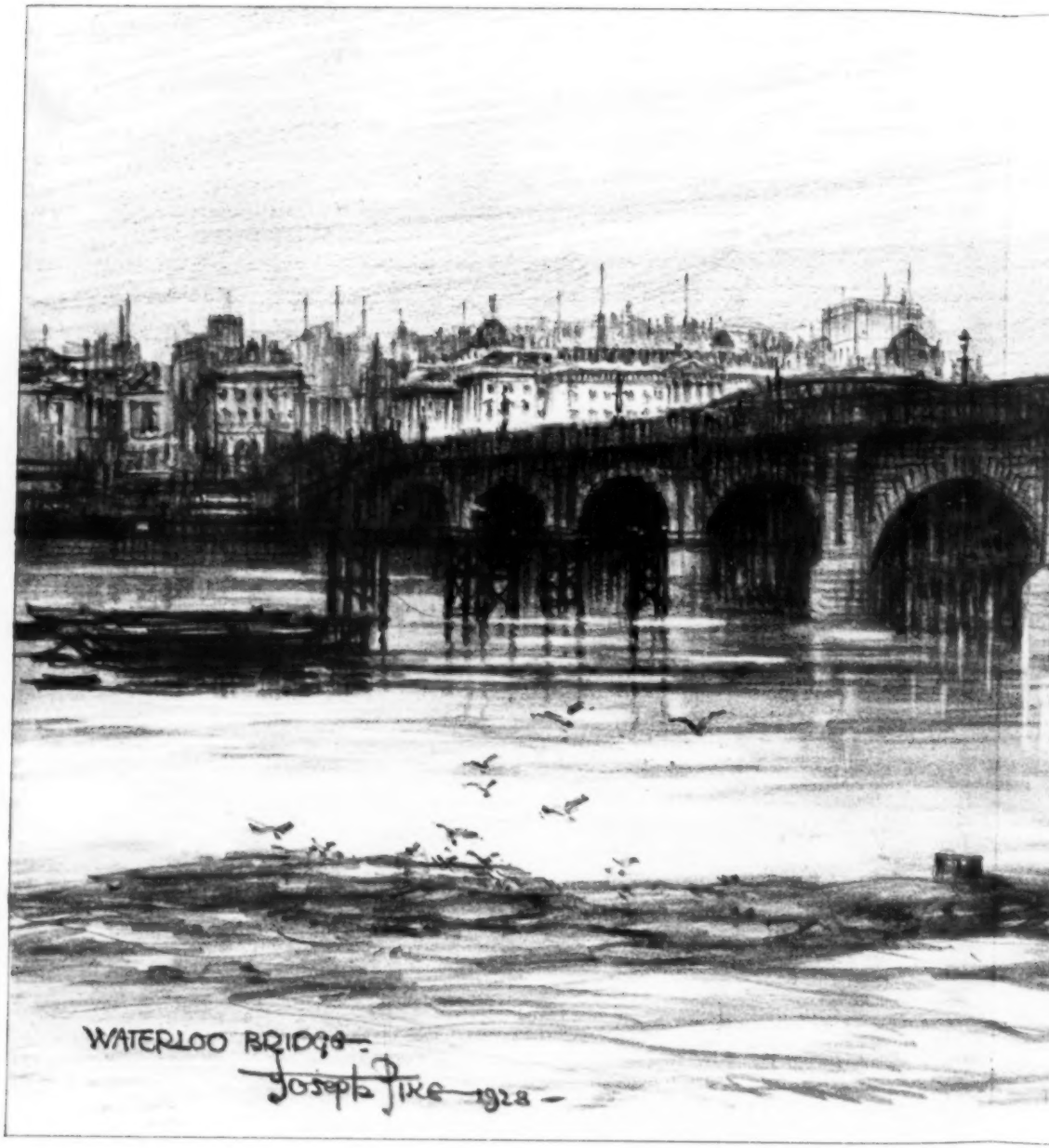
"The Builder" Ca



Waterloo Bridge from the South Side. A recen

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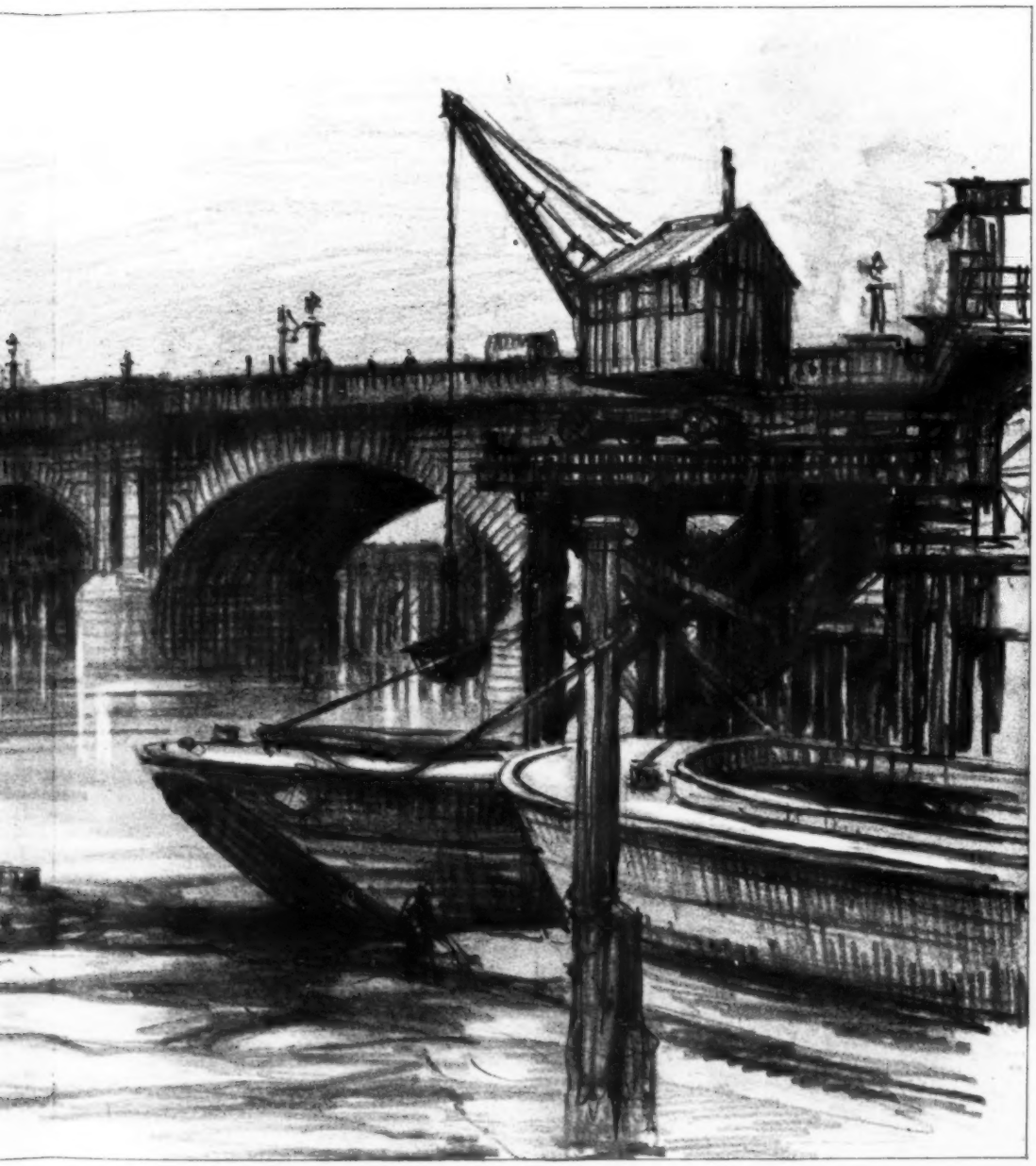
" Calendar, 1929.



Side. A recent Sketch by Mr. Joseph Pike.

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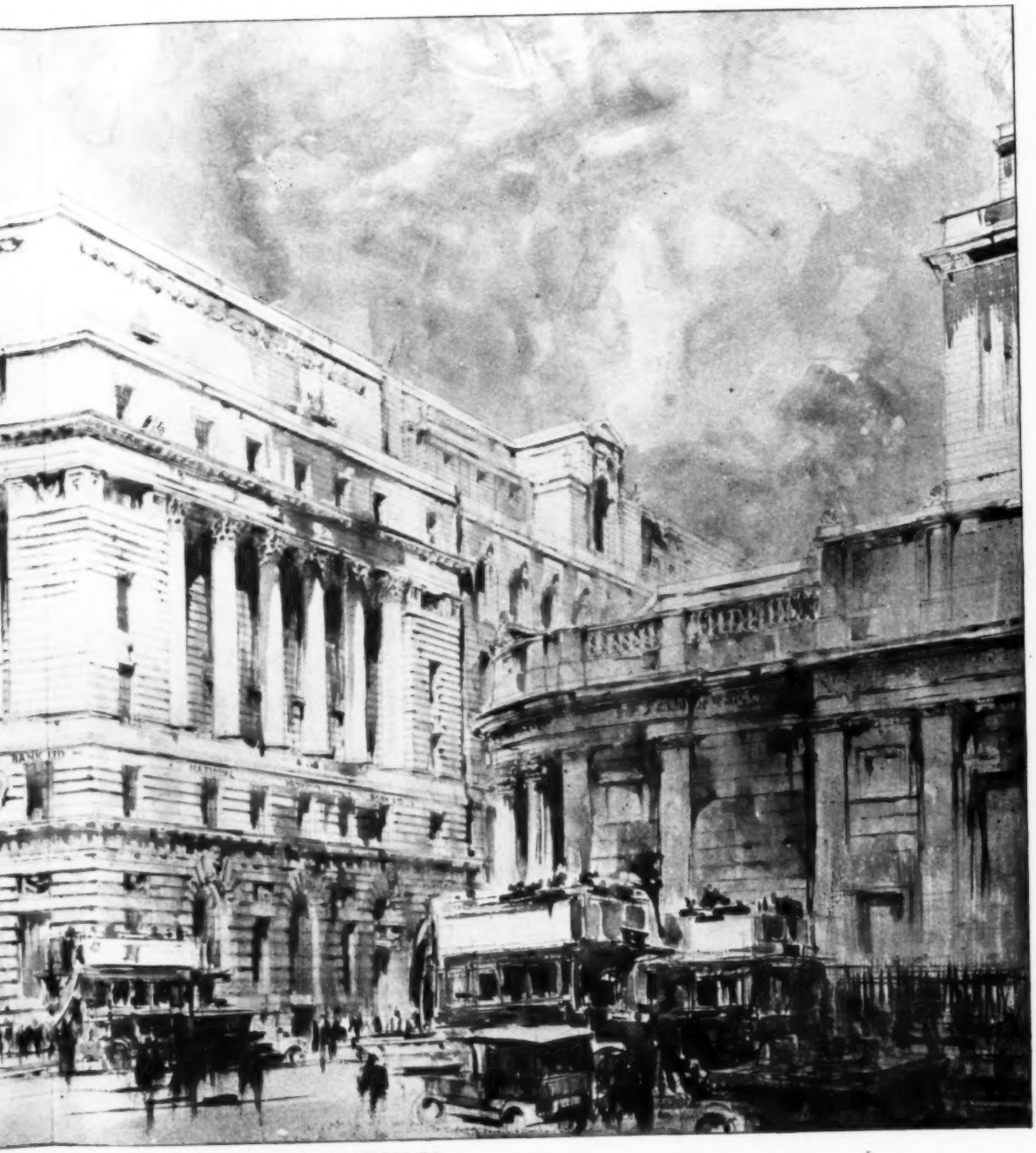
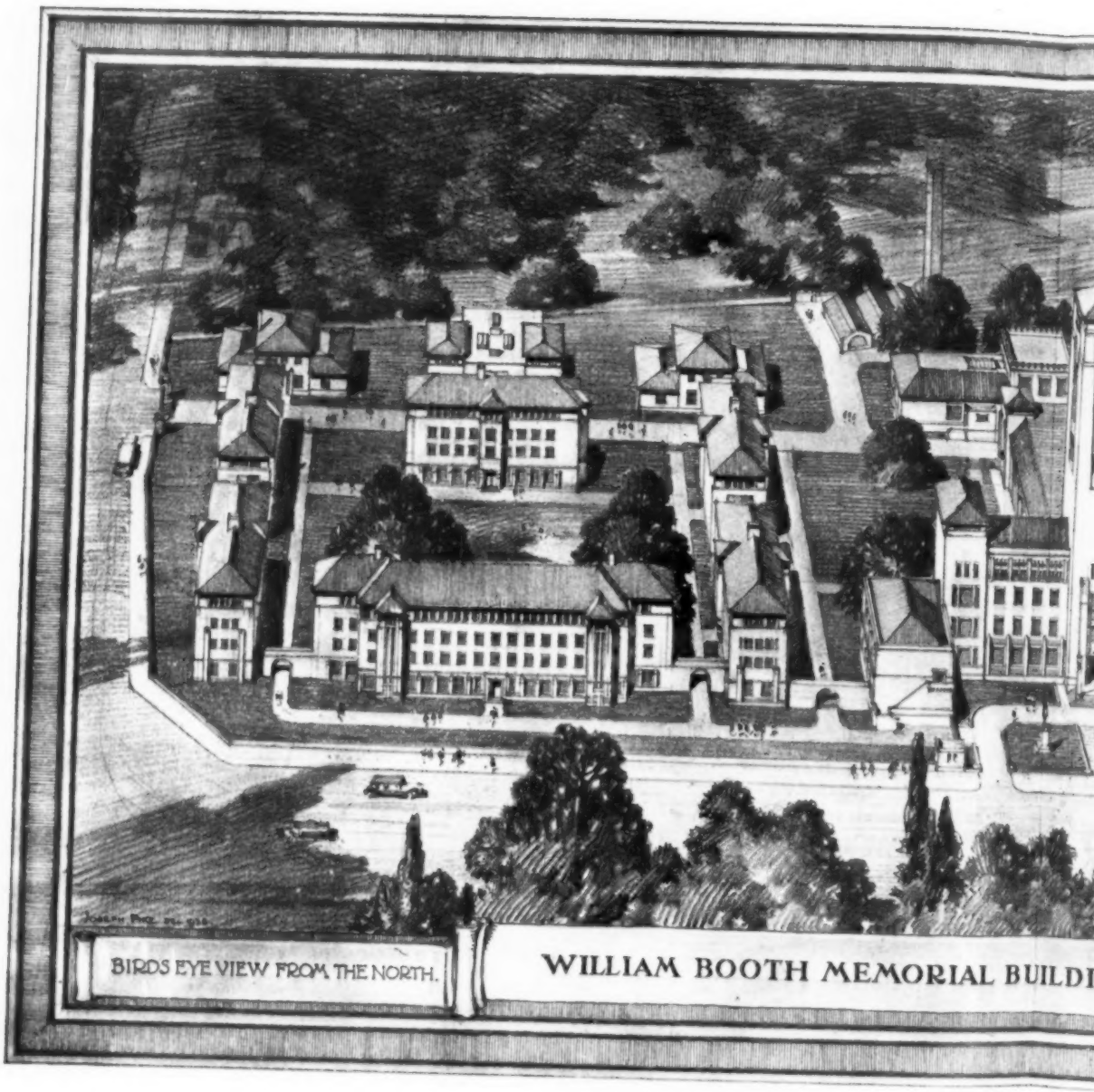
NEW NATIONAL PROVINCIAL BANK LTD., CORNER OF PRINCES
Sir Edwin Cooper, Arch



ORNER OF PRINCES STREET AND MANSION HOUSE STREET, E.C.
win Cooper, Architect.

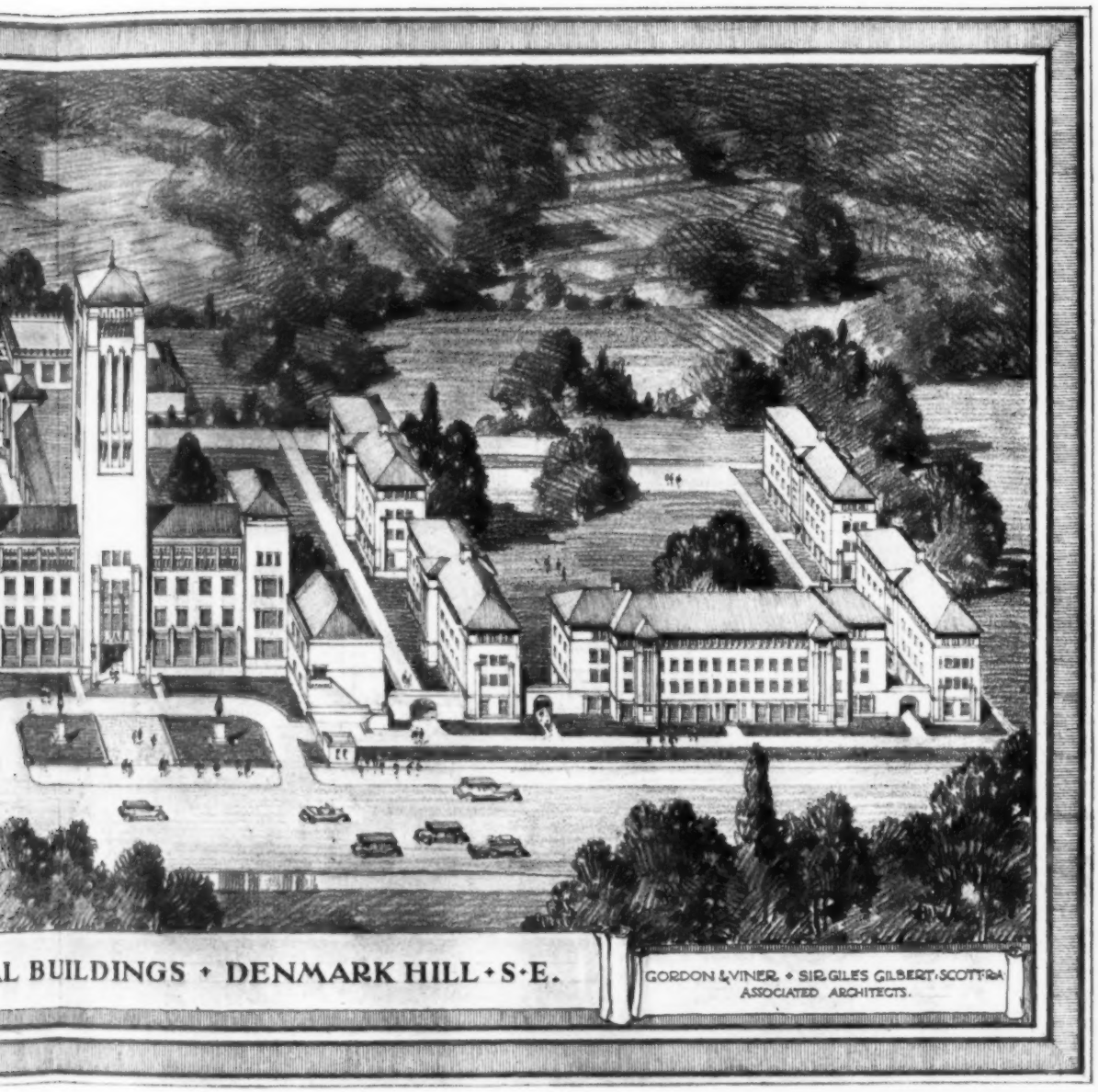
INTERIOR OF GENERAL OFFICES, ROYAL MAIL STEAM PACK
Sir Edwin Cooper, Arch

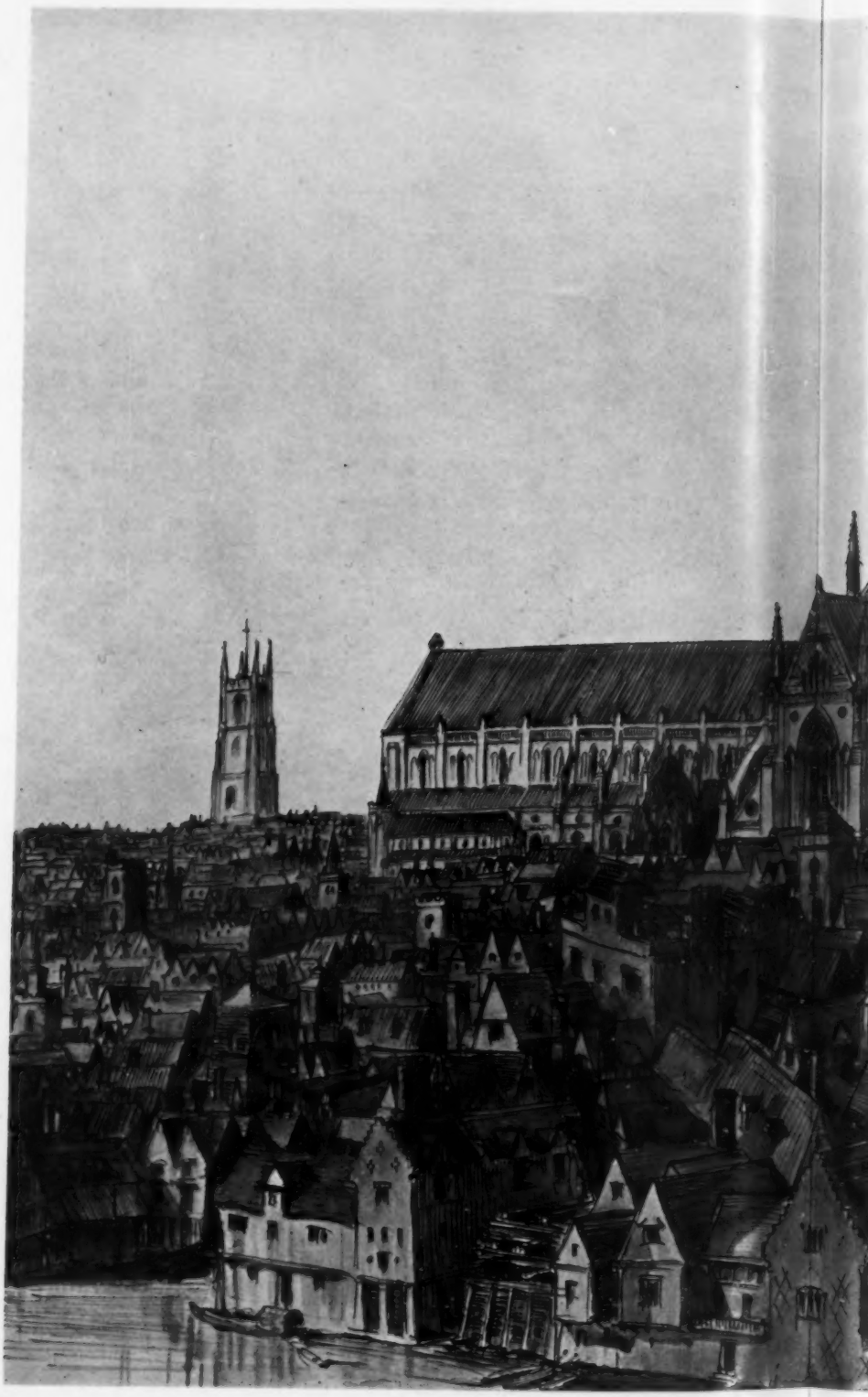
IAIL STEAM PACKET CO., LTD., LEADENHALL STREET, E.C.
vin Cooper, Architect.



BIRDS EYE VIEW FROM THE NORTH.

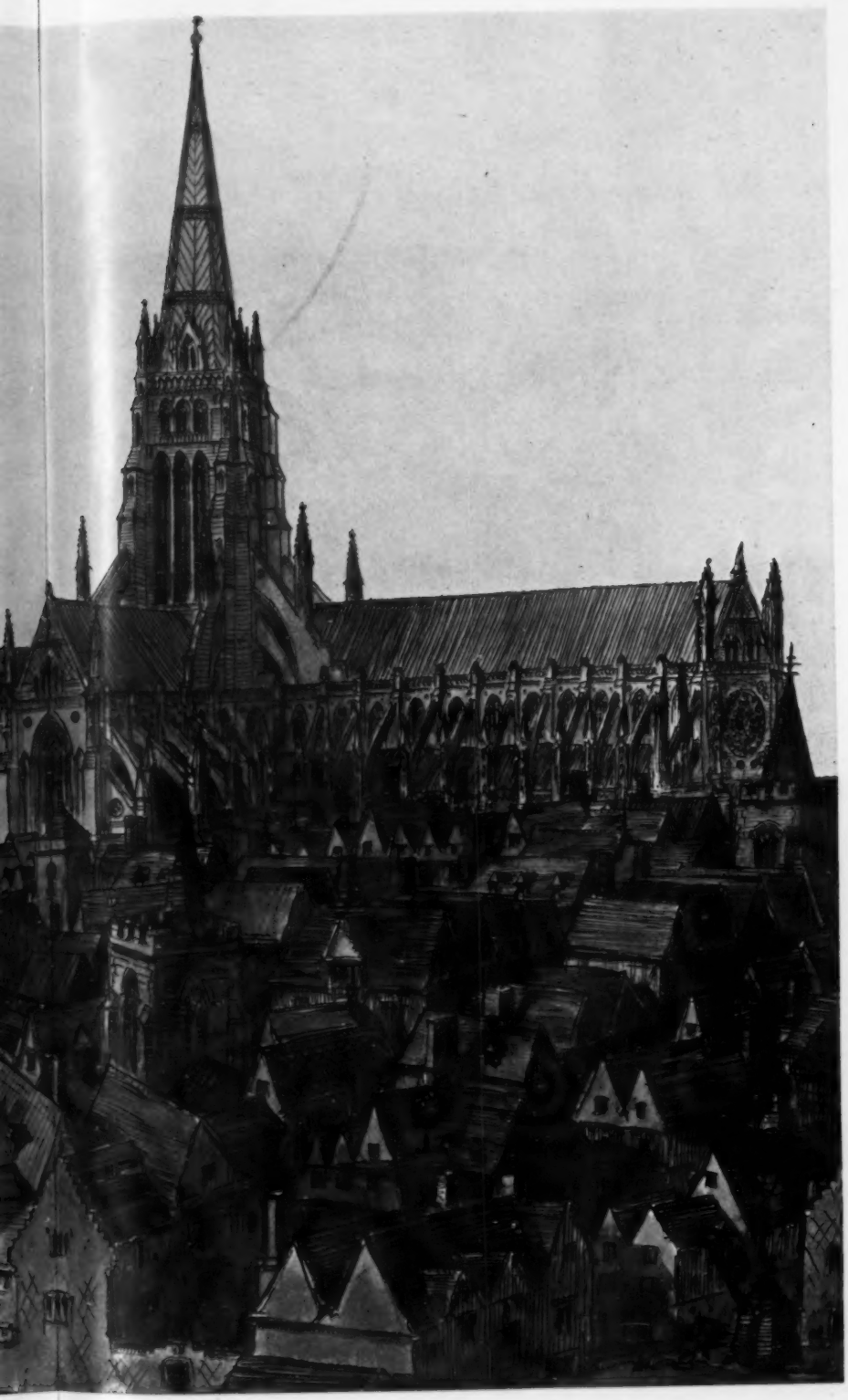
WILLIAM BOOTH MEMORIAL BUILDI


L BUILDINGS • DENMARK HILL • S·E.
GORDON & VINER • SIR GILES GILBERT SCOTT R.A.
ASSOCIATED ARCHITECTS.



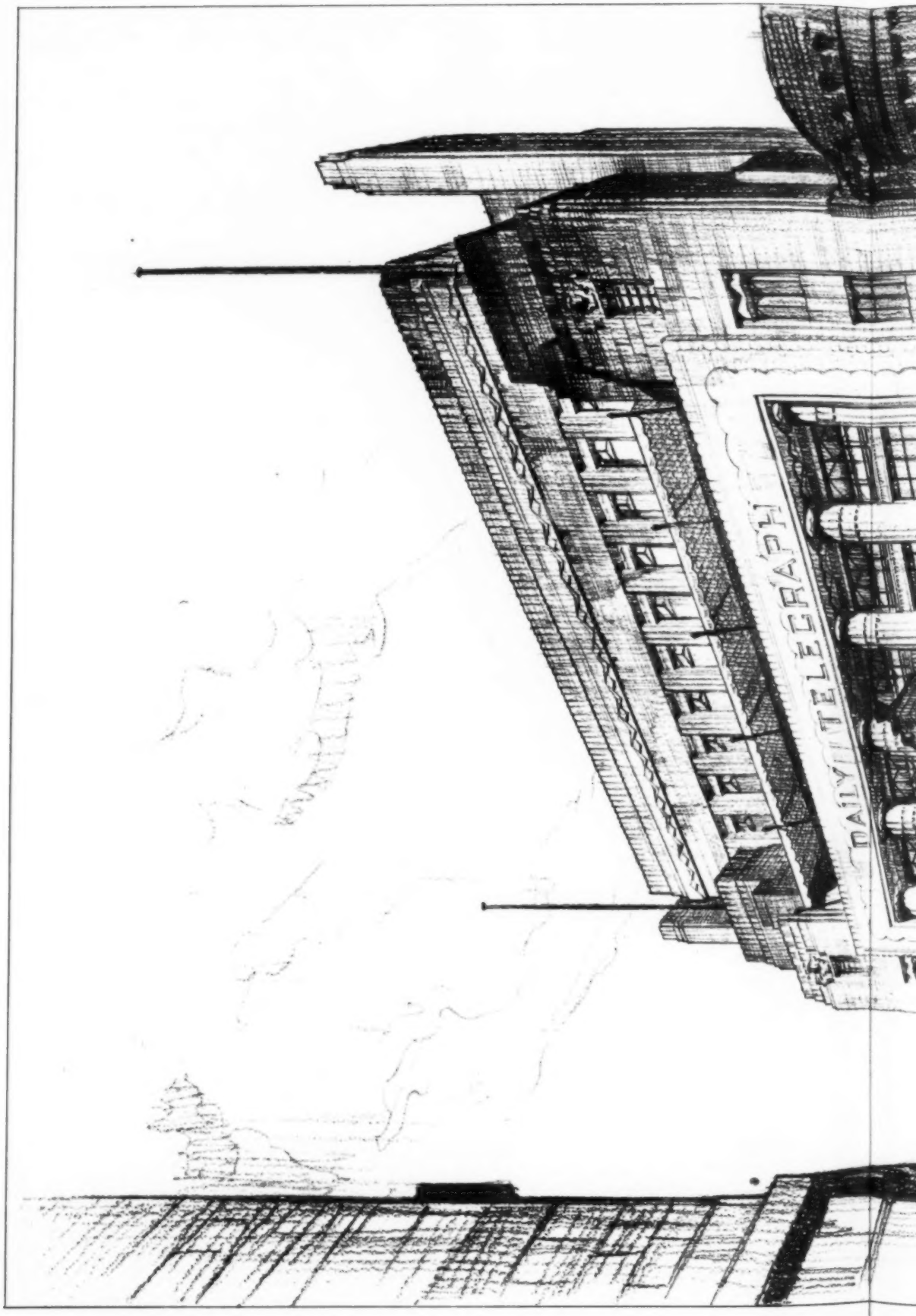
Old St. Paul's in the reign of

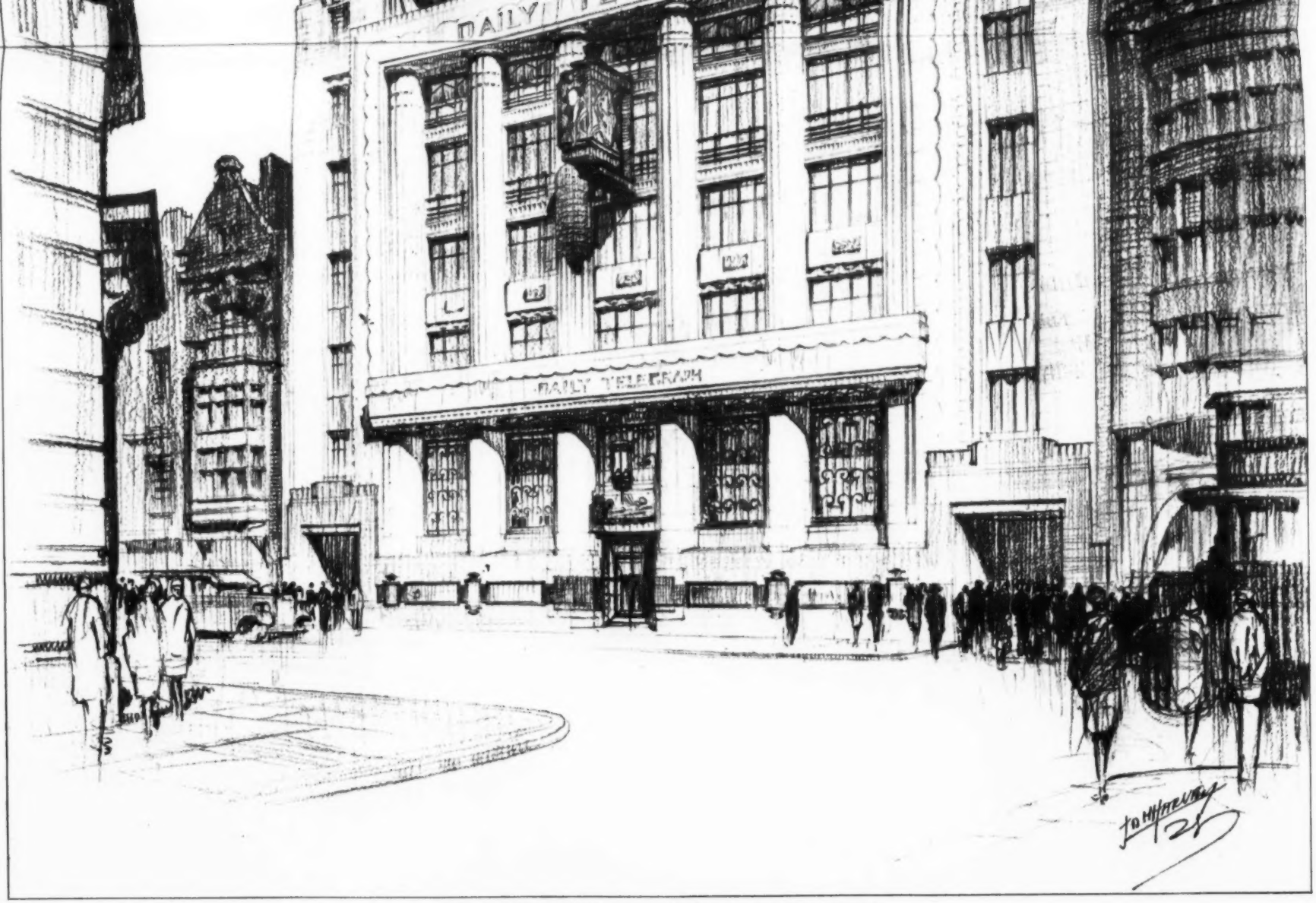
From a drawing by PROFESSOR A. E. RICHAR



in the reign of Henry VIII.

SOR A. E. RICHARDSON, F.S.A., F.R.I.B.A.


DAILY TELEGRAPH



THE "DAILY TELEGRAPH" NEW OFFICES, FLEET STREET, LONDON.

Messrs. Elcock & Sutcliffe, FF.R.I.B.A., and Sir John Burnet & Partners, Associated Architects.

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plumbing, sanitary fittings, drains; Blunt & Wray, architectural metal work; Greenway & Ludlow, Ltd., marble floors and wall lining; Benham & Son, kitchen equipment; York, Shipley, and Reid, McFarlane, cold storage; G. N. Haden & Sons, Ltd., heating, domestic hot-water supplies, and ventilation.

Messrs. Alexander Gordon and G. J. Morris Viner, LL.R.I.B.A., with Sir Giles G. Scott, R.A., are the associated architects.

The consulting engineers are Messrs. Dolby & Williamson; and the quantity surveyors, Messrs. Fleetwood, Eversden & King.

Old St. Paul's in the Reign of Henry VIII.

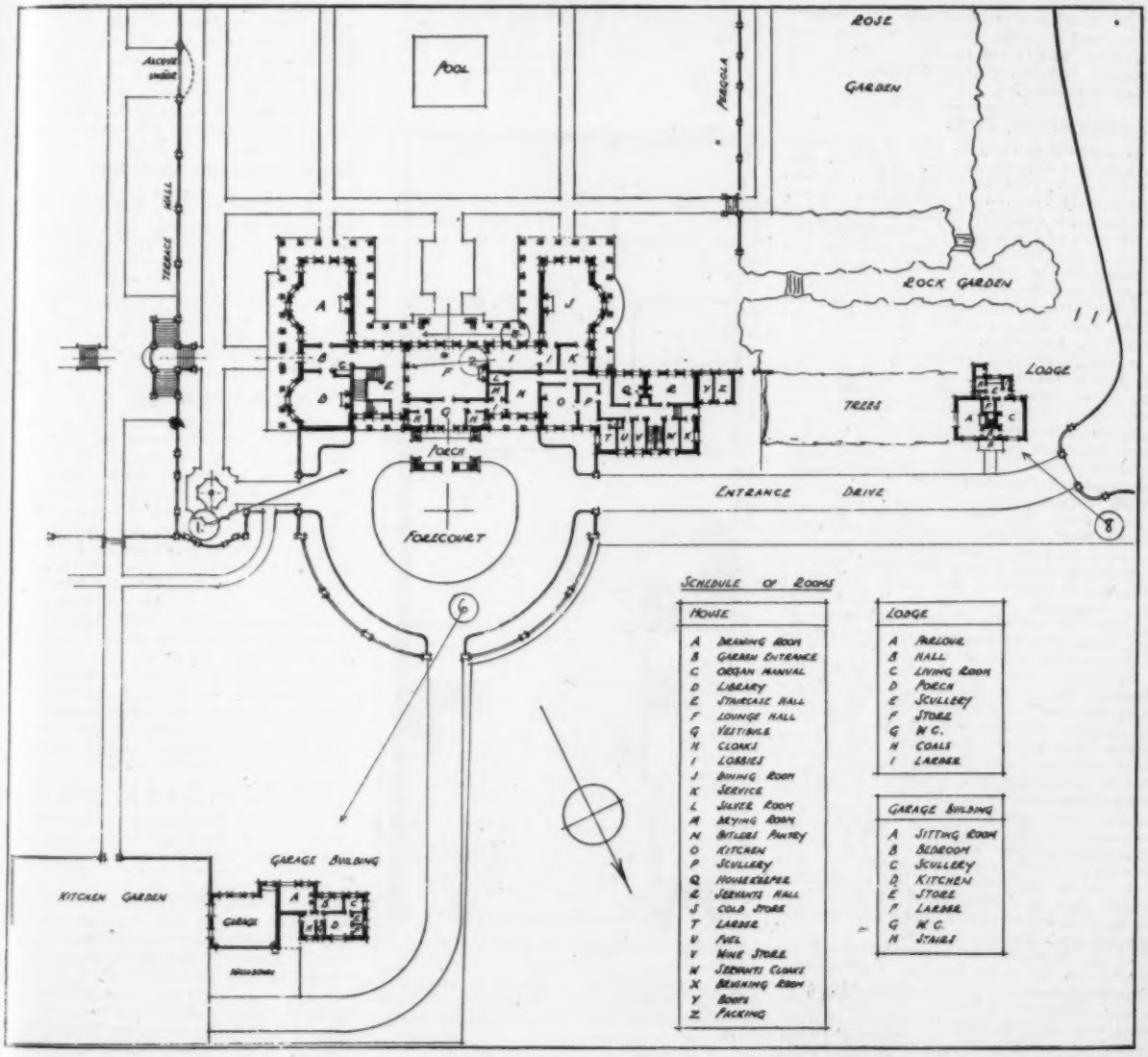
Professor Richardson has departed from his usual type of fantasy, and has attempted an imaginary view of Old St. Paul's and the surrounding houses from the river. In so far as the Cathedral is concerned, authentic records have been closely followed. The huddle of roofs, tiled and thatched, from Queenhithe to the Three Cranes, is purely conjectural. Prior to the Reformation, London was at the zenith of its mediæval splendour. The gilt cross over the pommel on St. Paul's spire rose nearly 500 ft. above the level of Cheapside. Brickwork was coming into favour for the newer houses owned by the Germans and the Flemings. The monastic houses and the palaces of the nobility in the city hereabouts were famed for magnificence. Professor Richardson has limited his pen to a view which is partly fantastic. It is evident that he is appreciative of the grotesque quality of the later mediæval period.

The "Daily Telegraph" New Building.

The whole of the present "Daily Telegraph" buildings on the Fleet Street front are in process of being demolished, and there will eventually rise on this site a block of modern office buildings which will incorporate in their construction and equipment the latest developments in this style of building. The façade will be 105 ft. long, and will rise to the full height allowed by the L.C.C. building regulations. The illustrations which we give show that the architects have been anxious not to "date" the building with any particular style, and though it is classic in spirit, the design is distinctly modern, with the largest possible windows to give ample lighting. The elevations to Fleet Street will be carried out with a high base of grey Scotch granite, and above this the face will be in Portland stone.

In the basement, ample strong-room accommodation is provided, with cloak rooms for the staff. On the ground floor, the whole of the available floor space is taken up with a large hall, which is utilised as the general public office, and is divided up by a vestibule, the walls of which are composed of glass in marble and bronze frames, which will not interfere with the view of the hall as a whole, and immediately on entering a visitor will get a sense of spaciousness and dignity. A large courtyard will be formed at the back of the main building, which will give ample accommodation for lorry and car traffic, and the two archways from the street will avoid the congestion which has been a great difficulty hitherto. Three high-speed lifts are placed at the end of the entrance vestibule with a suitable staircase.

The offices for the "Daily Telegraph" and Allied Newspapers, Ltd., are placed on the various floors, and on the fifth floor a fine panelled suite of rooms for the directors has been arranged with suitable board room, dining room, etc., adjacent. At the fifth floor level, a wide garden terrace is provided which in summer can be covered with a gaily-striped awning supported on bronze posts. This allows for the recessing of the upper part of the building, which will add considerably to the design. On the top floor accommodation is also found for large luncheon rooms, kitchen, etc., for the staff.



"Thanet House," Broadstairs.

MR. EDGAR RANGER, Architect, in collaboration with SIR CHARLES C. ALLOM.

All elevations to the interior courtyard will be faced with white glazed bricks, and the large windows will insure ample lighting to all parts. The well-known clock of the "Daily Telegraph" will be replaced by a timepiece representing the latest practice in clock design. Over the main entrance door a fine piece of sculpture will be placed to denote the influence of the "Daily Telegraph." Under the projecting balcony will be fitted lights, and the balcony and upper terrace will carry strong projectors, so that the whole building will be illuminated at night when required. The prevention of noise from this busy street is being largely overcome by the adoption of acoustic ceilings. An elaborate system of communicating telephones, automatic message carriers, etc., is being installed. The difficult nature of the sub-soil will require exceedingly heavy foundations, particularly as the whole of the interior of the building is carried on only four stanchions, and very heavy beams are being used so as to span the large areas involved.

The general contractors for the work are Messrs. James Carmichael (Contractors), Ltd. The constructional steelwork and the reinforced concrete work are in the hands of Sir E. Owen Williams, K.B.E., and the whole of the heating and electrical work is in charge of Messrs E. Wingfield-Bowles and Clay, consulting engineers.

The architects responsible are Messrs. Elcock and Sutcliffe, FF.R.I.B.A., who have associated with them Sir John Burnet and Partners, and Mr. Elcock and Mr. Tait are closely collaborating.

St. John's Church, Perth.

At a public meeting in 1918 of representatives of the city and county of Perth, presided over by the Duke of Atholl, it was unanimously resolved to restore the ancient church of St. John the Baptist as a memorial to the men of Perth and Perthshire who had fallen in the War. Sir Robert Lorimer was selected as the architect, and plans were prepared by him. The cost was estimated at £50,000. We take the following description of the work from a souvenir by the Rev. Dr. Walter E. Lee, M.A.

In 1923, when the restoration work began, St. John's was divided by thick stone walls into three separate churches. These partitions were of various dates; they hid the beauties of the building, which was rendered more deformed by the erection of galleries to accommodate the members of the three congregations that worshipped in St. John's. These congregations were known as St. John's East, St. John's Middle, and St. John's West. When the partition walls and galleries of the middle and west churches were taken down it was discovered that the pillars that supported the arcade walls were in a dangerous condition, and it was found necessary to take down eight pillars one by one, build a foundation for them, and rebuild them stone by stone.

Externally the church has been only slightly altered. The south wall of the nave has been rebuilt and raised about 9 ft. in height, whereby the church has been better lighted. On the north side of the nave new windows have been introduced, and the shrine has been erected. The Halkerstone Tower has been restored to its former height of two stories, and adds dignity and power to the whole building. The choir has been improved by taking away the dormer windows, which were introduced to give light to the galleries; and the balustrades, which were a modern addition, have been entirely removed, and replaced with straight cornices and blocking courses.

It is, however, in the interior of the church that the main features of the restoration are apparent. The ceiling is barrel-shaped, finished in fumed oak, and brightened with painted panels on which are represented six scenes from the life of Christ. The chief feature is the Shrine and the Chapel of Memory. This shrine is entirely new and forms the chief feature of the church as a war memorial. It is situated to the north-east of the nave and is in reality a chapel off the north transept. It takes the place of two comparatively modern bays. The shrine is entered from the west by a double arch which is new, and from the east by an old arch which had been hidden and partly destroyed by the erection of galleries. There is a richly mounted frame containing a panel which bears a general dedicatory inscription. Scrolls are carried on the surrounding frame. Above the panel and at the top and sides of the frame symbolic work has been introduced; and the coats of arms of the county and city have been included in the carved work, enhanced by artistic work in colours. There is a stone table beneath the frame on which the Golden Book, containing the names of those commemorated (5,000 in number) is encased. The shrine is beautified by a three-light window illustrative of the text, "And there was war in heaven." A figure in bronze of John the Baptist stands to the left of the shrine, the work of Fanindra Bose, A.R.S.A., a young Indian sculptor, whose early death was a loss to art.

The west window is descriptive of scenes in our Lord's life—the chief and centre picture depicts the Nativity, with an attendant angel at either side, one holding a cross and the other a crown. This window is designed to allow the maximum of light to enter the church. A small window on the north side of the nave illustrates Elizabeth, the mother of John the Baptist, teaching her son, while below is seen St. John before Herod.

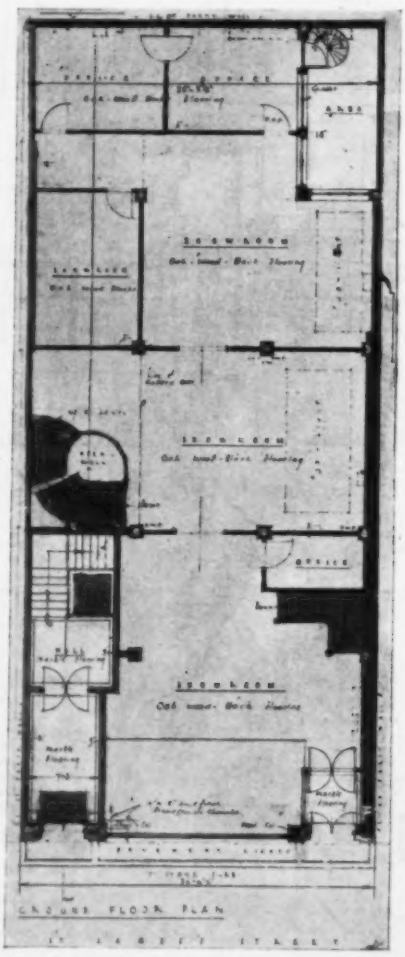
While the preliminary work was in progress there were discovered some stones which were judged to be remnants of former windows, and these have been used to introduce square windows into the church, such as are found in other churches of a similar date. There was also found in one of the pillars a carved niche which is judged to have held a silver statue, perhaps of some saint. There are said to be only two or three similar niches in Scottish churches.

In the south transept a window illustrating the Old Testament prophets is to be introduced. The pulpit is a reproduction of John Knox's pulpit preserved in the Antiquarian Museum in Edinburgh. It is made of oak and is richly carved. The canopy is supported by a strong wrought-iron arm.

In the choir, the timbers of the main roof are now exposed as in the past. The aisle ceilings are panelled in oak with carved bosses at the intersections. The organ, which has been enlarged and rebuilt, is beautified by a richly carved oaken case. The Communion Table commemorates the eight ministers who served the east church during the 100 odd years in which it was a separate parish church. There are two minister's chairs, both commemorative, one of Mr. Andrew Miller, and the other of Bailie James Macfarlane. The choir stalls are richly carved and in keeping with the rest of the decorative work. The great east window, which represents the Crucifixion, is by Strachan.

The contractors for the restoration were Messrs. Ramage & Cooper, Perth. There were also sub-contractors, many of whom were Perth tradesmen. The wood carving of the interior of the church was executed by Messrs. W. & A. Clow, of Edinburgh. The joinery was by Messrs. Soutar & McQueen, of Perth, and the organ was rebuilt by Mr. Frederick Rothwell, of Harrow.

[Our reproductions are from photographs by Mr. Francis Caird Inglis, of Edinburgh.]



New Premises, St. James's Street, W.
MESSRS. YATES, COOK & DARBYSHIRE, Architects.

Lloyds, Leadenhall-street, E.C.

Our illustrations show "the Room" completed, with the Crier's Rostrum, containing the Lutine Bell, erected and the furniture in position. A detail of the Rostrum is also illustrated. Sir Edwin Cooper is the architect, and the builders are Messrs. John Mowlem & Co., Ltd. A full description of the new Lloyds was given in our issue for March 30, 1928, together with a list of the sub-contractors, craftsmen, and others associated with the work.

Stratford-on-Avon Bridge.

The new bridge at Stratford-on-Avon, which has been designed by Sir Reginald Blomfield, R.A., will follow the line of the small brick bridge which was constructed by the Great Western Railway for a single line, but never used for that purpose. The new bridge will cross the river below the old Clopton Bridge, which will be left intact. It will be constructed with brick arches under the footpaths and reinforced concrete arches under the roadway; two pavilions will be formed on the town side, containing staircases for access to the gardens below. In the drawing which we give, the new Theatre is shown in the background, and the view is supposed to be taken from the Clopton Bridge. Sir Reginald's first proposal was to build the bridge higher up the river, above the Clopton Bridge, which would have allowed a straight run in on a raised causeway across the low ground, to join the main street where it rises up the hill to the centre of the town. The approach might have been made one of the finest in England, but the cost of the roads prevents it's being carried out.

Ashley Chase, Dorset.

This house was built some three years ago on a site looking towards the sea, near Abbotsbury. It was built by the client by direct labour, in local stone quarried practically on the site, with Ham Hill stone dressings to the windows and doorways. It is roofed with stone slates by Messrs. Roberts, Adlard & Co. The windows have iron casements and lead lights, which were provided and fixed by Mr. John H. Pye, of Moreton-in-Marsh. The central-heating system was

installed by Messrs. G. N. Haden & Sons, and the internal plumbing and sanitation by Messrs. Dent & Hellyer.

Mr. E. Guy Dawber, A.R.A., P-P.R.I.B.A., is the architect.

Bank, Spitalfields Market.

This is an interesting example of a small City bank to be erected on a corner site. It is to be built of brick generally, on a stone plinth, with stone dressings to doors and windows.

The general contractors are Messrs. Bovis, Ltd., and the following are sub-contractors :—J. A. Lawford & Co., asphalt; F. J. Barnes, Ltd., stonemasons; Brookes, Ltd., granite mason; Drew-Bear, Perks & Co., Ltd., steelwork; Hope's Heating and Lighting, Ltd., heating; Diespeker & Co., patent floors; George Johnson, Ltd., lift (small book); Strenic Construction Co., Corsham, Wilts, artificial stone staircase.

Messrs. W. Curtis Green, A.R.A., and Partners are the architects.

New Cemetery Chapels and Lodges, Camberwell.

These new cemetery chapels and lodges for the Camberwell Borough Council are being erected in Bargate stone with Portland stone dressings. The sub-contractors are as follows :—Messrs. Richard Anderson and Co., lightning conductor; the Crittall Manufacturing Co., Ltd., steel sashes; Dent and Hellyer, sanitary fittings; Thomas Faldo and Co. (Val de Travers Asphalte Co.), asphalt work; J. Jeffreys and Co., heating installation; Redpath, Brown and Co., Ltd., steelwork; J. R. Pearson (Birmingham), Ltd., weather vane; Galbraith Bros., Ltd., Portland and Bargate stone work.

Sir Aston Webb and Son are the architects.

National Provincial Bank, Shrewsbury.

The mature work of the English Renaissance has here provided inspiration for a building of unusual architectural distinction. It is built of brick generally, with stone dressings, some refined detail, admirably placed, giving added grace to the elevation.

The general contractors were Messrs. William Bowers & Co., Hereford, and the following were sub-contractors :—The Bath and Portland Stone Firms, Ltd., Bath, Portland stone; G. & A. Brown, Ltd., stone carving, wood carving, fibrous plasterwork, lead vases; George Wragge, Ltd., steel casements, dome lights and ironmongery; J. R. Pearson, Ltd. (Birmingham), bronze lettering and grilles, etc.; Dorman Long & Co., constructional steelwork; the British Reinforced Concrete Engineering Co., Ltd., steel reinforcement; Mellowes & Co., Ltd., steel lantern lights; Deane & Beal, Ltd., heating and hot-water system; Anselm, Odling & Co., marble work; the Birmingham Guild, Ltd., wrot-iron gates and grilles; Sir John Bennett, Ltd., clock; Smith, Major & Stevens, Ltd., bullion lift; Craven, Dunnill & Co., Jackfield, Shropshire, strong-room tiling; M. Van Straaten & Co., floor tiling; E. B. Burgess & Co., Liverpool, wood-block flooring; Roberts, Adlard & Co., bricks and tiles.

The architects are Messrs. F. C. R. Palmer & W. F. C. Holden, FF.R.I.B.A.

National Provincial Bank, Leatherhead.

The architects to this banking corporation, Messrs. F. C. R. Palmer & W. F. C. Holden, FF.R.I.B.A., have erected a great number of branch banks in various parts of the country, and it is their practice, whenever possible, to design their buildings in sympathy with the traditional work of the neighbourhood. In the present case, the half-timber work of Surrey has provided inspiration for a building which is perfectly in keeping with its environment.

The general contractors were the Ringmer Building Works, and the following were sub-contractors :—Frederick Tibbenham, Ltd., oak carving; Geo. Johnson, Ltd., book lift; Buchanan & Curwen, electrical engineers; Geo. Wragge, Ltd., casements, leaded lights, ornamental lead panels, and wrought-iron sign, etc.; C. A. Williams & Son, curtains; City Iron Co., Sussex fire back, basket, dogs, stoves, sanitary fittings; E. Deane & Beal, Ltd., heating and hot water supply apparatus; Roberts, Adlard & Co., 2 in. Dutch red facing bricks; Colliers, of Reading, 1-in. multi-coloured brickettes; Martin Van Straaten, tiles.

House in Wilderness-avenue, Sevenoaks.

This house is built on a site where there is a considerable slope in the ground, and the levels of the floors are arranged to follow the slope so that the house may appear to grow out of the ground rather than to be planted in it. The general idea of the interior is to get away from the type of plan which consists of a series of rectangular plastered boxes called rooms and to introduce some variety and character into each room. The principal living-room is arranged in two levels with a kind of "altar-rail" to the upper part forming a backing to a couch placed at right angles to the fireplace. A feature of the house is the type of high window opening on the staircase and bedroom recess of pointed form glazed with stained glass. Such variations from the normal are possible in a house like this, built to be sold to anyone who may appreciate it and not to meet the demands of a special client.

Messrs. Baillie Scott and Beresford are the architects.

Southampton Civic Centre.

This scheme comprises Town Hall in centre, Municipal Offices to the south, Art Gallery and School of Art to the north, and Police Courts and offices to the west. These are planned as separate units so that the scheme may be built in portions. The bird's-eye view shows a tower incorporated. This is merely tentative and only included to show a suggested position. The whole elevation will be in Portland stone. The bird's-eye view is by Mr. Cyril Farey, and the other drawing by Mr. H. L. G. Pilkington.

Mr. E. Berry Webber, A.R.I.B.A., is the architect.

"Skaill," South Hill-avenue, Harrow-on-the-Hill.

The plans and elevations of "Skaill" were illustrated in *The Builder* for April 13, 1928. London stocks were used for the facings generally, with multi-colour bricks introduced in connection with the porch, chimney, and brick windows. Hand-made tiles were used for the roof. Messrs. Geo. Wragge, Ltd., supplied the steel casements and leaded lights, and Messrs. Thos. Potterton were responsible for the central heating. The builders were Messrs. John Smith & Co., of Harrow.

Mr. A. Percival Starkey is the architect.

King William-street House, E.C.

This building has been erected on a site bounded by Arthur-street and Miles-lane, near London Bridge, and provides extensive floor space suitable for division into suites of offices. The entrance is flanked by columns and leads to inner hall, from which access is gained by four passenger-lifts to every floor. A well-lighted semi-circular staircase of marble is also provided. Particular attention has been given to the provision of light to every part of the building, all the windows being carried up to the ceilings. Central heating is installed throughout the building, and letter chutes are provided from top floor to basement for postal collections in the building. Provision has also been made for the installation of synchronised electric time-dials. Independent suites of lavatories on various floors are arranged for both sexes, with separate accommodation for principals. Bathrooms and dressing-rooms are provided, and, for the convenience of tenants, a rest room has been arranged, at which light refreshments can be obtained. Owing to the conformation of the site, the lower ground floor is nearly all at ground level and is practically a ground floor. The basement contains a large number of specially constructed strong rooms and storage rooms.

The building is owned and managed by Messrs. Spiers and Son, Ltd., builders and contractors, of 2, Hill-road, St. John's Wood, and has been built for them by the Anglo-Scottish Construction Co., though the owners have been doing all the fitting up of the interior. We understand that some important City firms have taken space in the building, mostly in large portions, and some in whole floors. Following is a list of the sub-contractors:—The Stone and Marble Co., stonework; Hammond Bros. and Champness, Ltd., lifts; Le Grand, Sutcliff and Gell, Ltd., artesian well; R. Whittington and Co., Ltd., central heating; Francis Polden and Co., Ltd., and H. Chapman, electric light; The Central Joinery Co., Ltd., joinery (some joinery work has also been done by Messrs. Spiers and Son, Ltd.).

Messrs Gunton and Gunton, FF.R.I.B.A., are the architects.

Thanet House, Broadstairs.

This house, one of the largest to be built since the war, has been erected for Sir Edmund Vestey, Bart. The accommodation provided may be studied from the plan given on page 105. The stonework of house and terrace is Portland stone, as also is the paving of the colonnade, the stonework of the entrance gates and coping to walls being Ham Hill stone. Heating is from under floor, the radiators being in iron boxes below bronze gratings. An Æolian organ has been erected below the staircase hall. There are double windows throughout the main rooms, the inner window sliding into a cavity of wall, and the outer window opening inwards. These outer windows are planned to be the same width as the thickness of the wall, so that they do not project into the room when open and are clear of the curtains.

Messrs. T. T. Denne, Ltd., of Upper Walmer, Deal, were the contractors, and White, Allom & Co. the decorators. The sub-contractors were as follows :—Ham Hill and Doulting Stone Co., and Nine Elms Stone Masonry Works, stonemasons; Comyn Ching & Co., central heating; Roberts, Adlard & Co., tiling; Allom Bros. and F. J. Malpress, electrical engineers; Shanks & Co., Ltd., and John Bolding & Sons, Ltd., sanitary fittings; Birmingham Guild and Watson, Dennis & Co., wrot iron work; Hollis Bros., oak floors; H. Young & Co., steelwork; Waygood-Otis, Ltd., lifts; George Wragge, Ltd., and C. E. Welstead, casements; The Standard Cork Co., cork floors; Messrs. Jenkins, marble.

Mr. Edgar Ranger is the architect, in collaboration with Sir Charles C. Allom. Messrs. Foster & Barber were the quantity surveyors.

Premises, St. Helen's-square, York.

The new building illustrated is to be erected upon the site of Harker's Hotel, in one of the most important squares of York. Owing to the traffic congestion at this point, the square is being widened to 60 ft. The building will consist of six shops, and upper parts on two floors, and will be constructed with a sand-faced facing brick with stone dressings, roofed with green slates and constructed with timber floors. An attempt has been made to preserve the character of the city of York and the scale of the City Hall, which abuts on one side of the square. The demolition of Harker's Hotel, which is practically completed, is being carried out by Messrs. Geo. Moss & Sons, of Pennington Saw Mills, Leigh, Lancs.

Messrs. T. P. Bennett & Son are the architects.

"Church Close," Church-street, Kensington.

The photograph given illustrates a view of some modern flats which have been erected in Church-street, Kensington. The design is a modern adaptation of the Tudor period, and an attempt has been made to produce the spirit of that period and at the same time

to create flats with every modern improvement and convenience. The various flats are grouped around an internal quadrangle, which is pleasantly laid out as a garden, and at the rear a large ornamental garden has been formed which enhances the amenities of the building. Red and purple facing bricks and stone dressings have been used for the elevations, and the roofs have been covered with hand-made sand-faced tiles. A feature of the design is the ornamental chimney stacks.

The general contractors were the Canonbury Construction Co., Ltd., and the sub-contractors were Messrs. D. Drake & Son, Bournemouth; Crittall Manufacturing Co., Ltd.; Enfield Stone Co., Ltd.; A. Goldstein & Co.; Dennis & James; Leverstock & Acorn Red Brick Co.; Ames & Finnis; Smith, Walker, Ltd.

The architects were Messrs. Yates, Cook & Darbyshire.

31-32, St. James's-street, S.W.

This building has been erected to house the well-known antique firm of Messrs. Albert Amor. The elevation has been carried out in Portland stone. A feature of the front is the symmetrical lay-out of the shop-window, with two entrances on either side—one giving access to the galleries and one to the offices over. The whole of the office entrance, including the walls and ceiling, has been panelled in oak, treated with lime. The galleries have been decorated in a simple style, so as not to clash with the exhibits therein, and the walls have been covered with a fine canvas of a neutral colour, which forms a suitable background for its purpose.

The general contractors were Messrs. F. G. Minter, Ltd., and the sub-contractors were Messrs. the Berkeley Electrical Engineering Co., Ltd.; J. Starkie Gardner, Ltd.; Arch. D. Dawney & Sons, Ltd.; Wm. Mason & Son, Ltd.; Crittall Manufacturing Co., Ltd.; E. J. & A. T. Bradford; Haywards, Ltd.; Caxton Floors, Ltd.

The architects were Messrs. Yates, Cook & Darbyshire.

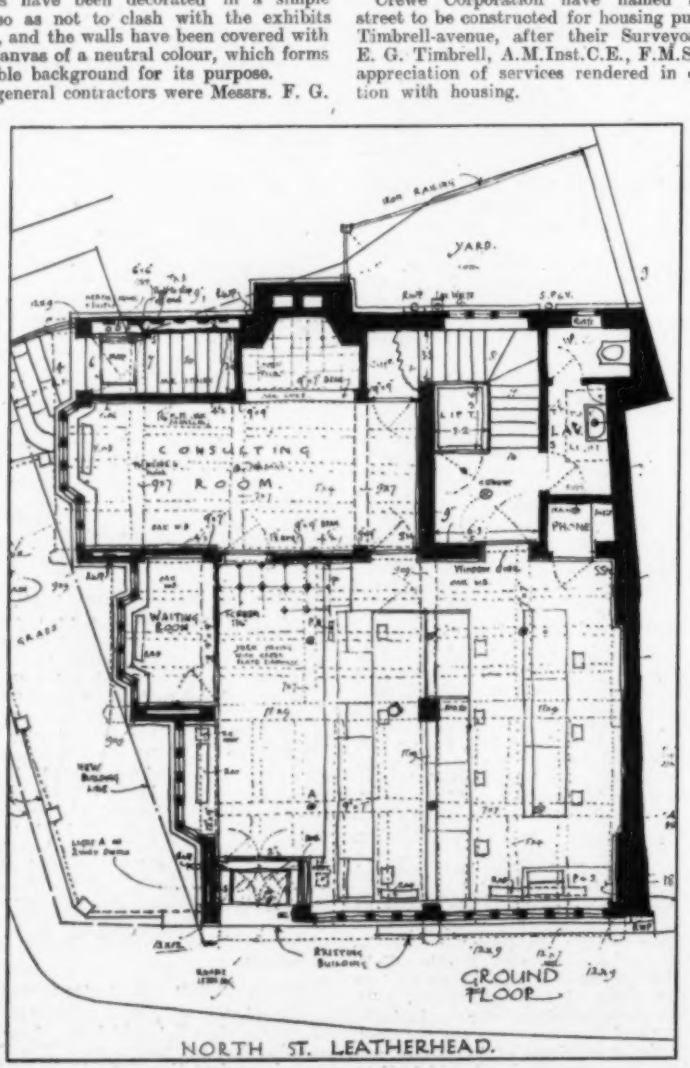
New South London Store, Brixton-road, S.W.

This building, erected in three sections, is the feature of the shopping centre of Brixton. The floor space is about 60,000 square ft. An arcade runs the whole length of the building, with windows on both sides. The whole block has been erected without interfering with the carrying on of the business. The general contractors were Messrs. A. & F. J. Leather, Ltd., of Camberwell, S.E., and the following were sub-contractors:—Leeds Fireclay Co., Ltd., terra-cotta; Siegwart Fireproof Floor Co., Ltd., fireproof floors; Redpath, Brown & Co., Ltd., and Aston Construction Co., Ltd., steelwork; Express Lift Co., Ltd., lifts; Mather & Platt, Ltd., sprinkler installation; Dreadnought Fireproof Door Co., Ltd., fireproof doors.

Messrs. H. Payne Wyatt, Son & Partner are the architects.

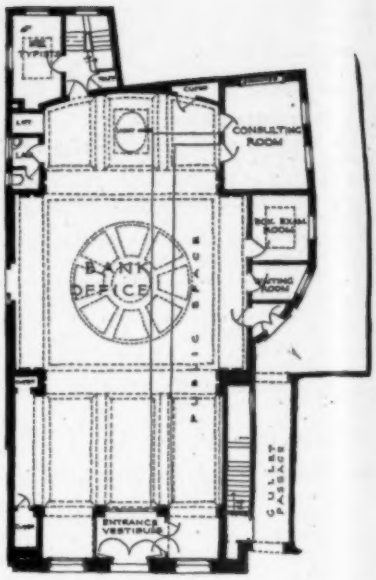
Street Named after Surveyor.

Crewe Corporation have named a new street to be constructed for housing purposes, Timbrell-avenue, after their Surveyor, Mr. E. G. Timbrell, A.M.Inst.C.E., F.M.S.A., in appreciation of services rendered in connection with housing.



National Provincial Bank, Leatherhead.

MESSRS. F. C. R. PALMER and W. F. C. HOLDEN, FF.R.I.B.A., Architects.



National Provincial Bank, Shrewsbury.

MESSRS. F. C. R. PALMER and W. F. C. HOLDEN, FF.R.I.B.A., Architects.

R.I.B.A. PRIZE AWARDS

The Tite Prize: Certificate and £50:—Wm. Crabtree, New York (Liverpool University School of Architecture). Honourable Mention:—1, C. St. C. Oakes (Northern Polytechnic); 2, J. L. Martin (School of Architecture, Victoria University, Manchester); 3, F. R. S. Yorke (Birmingham School of Architecture); 4, John F. D. Scarborough, 343, Little Collins-street, Melbourne.

The Victory Scholarship: Silver Medal and £150:—(Miss) Betty Scott (Architectural Association). Honourable Mention:—1, E. E. G. Gardner (Architectural Association); 2, George A. Goldstraw, B.A., A.R.I.B.A. (School of Architecture, Victoria University, Manchester).

The Pugin Studentship: Silver Medal and £75:—R. H. Matthews (Edinburgh College of Art). Honourable Mention:—F. Russell Cox (Birmingham School of Architecture).

The Owen Jones Travelling Studentship and £100.—Not awarded.

The Royal Institute Silver Medal and £50 for an Essay:—James F. Howes (Royal Academy School of Architecture).

The Henry Saxon Snell Prize.—Not awarded.

The R.I.B.A. (Alfred Bossom) Travelling Studentship: Gold Medal and £250:—Frank Scarlett, B.A., A.R.I.B.A. (School of Architecture, London University). Silver Medals awarded to:—1, T. W. Snailum, A.R.I.B.A. (Architectural Association); 2, Frank Scarlett, B.A., A.R.I.B.A. (School of Architecture, London University); 3, Johnson Blackett, A.R.I.B.A., Newport, Mon.; 4, A. A. V. Campbell, A.R.I.B.A., 8t, James's-street, S.W.1.

The Grissell Gold Medal and £50.—Not awarded. Honourable Mention:—L. M. Chitale, A.R.I.B.A. (School of Architecture, London University).

The Godwin and Wimperis Bursary: Silver Medal and £250:—Hope Bagenal, D.C.M., A.R.I.B.A., 34, Bedford-square, W.C.1.

The Arthur Cates Prize:—Not awarded.

The Ashpitel Prize, 1928:—James Thomas Castle, A.R.I.B.A., Roehampton, S.W.15.

The R.I.B.A. Silver Medal for Schools of Architecture Recognised for Exemption from the Final Examination:—David Bowen Solomon (Liverpool University School of Architecture).

The R.I.B.A. Bronze Medal and £5 in Books for Schools of Architecture Recognised for Exemption from the Intermediate Examination:—Herbert Jackson (Birmingham School of Architecture).

The County Hall. Scheme for Completion.

We learn that actual building operations on the County Hall, Westminster, are expected to begin in the autumn. The original designs are to be followed, with the exception that the new blocks of offices will contain ten stories instead of nine. This, however, will not affect the total height of the buildings. The total cost is assessed at approximately €600,000, £200,000 less than the estimate drawn up in 1922, when the Hall in its present state was opened.

DECAY IN BUILDINGS.

THE President, Mr. Walter J. Tapper, A.R.A., was in the chair on Monday night, when a paper was read at 9, Conduit-street on "Cracks and Decay in Buildings due to Expansion and Contraction," by Dr. Oscar Faber, O.B.E., D.Sc., M.Inst.C.E. The lecturer said that the object of his paper was to indicate as shortly as reasonable accuracy would allow the causes of movements in building materials, in the hope that it would assist his colleagues to a better understanding of when to expect cracks and how to avoid them. He would classify materials into three main groups :—(i) Non-porous and impervious; (ii) porous but seasoned; (iii) porous but unseasoned.

I. Impervious Materials.—That group was by far the simplest. It was represented by the metals, such as steel, but other materials such as marble and granite approached closely to imperviousness. Impervious materials changed their length in two ways :—(*a*) By change of temperature, (*b*) by change of stress.

(*a*) Thus steel expanded approximately .000006 inches per inch per degree Fahr. rise in temperature (the expansion being practically proportioned to the temperature change). That might seem so little as to be of no interest to "practical men," who, so far as he could gather, were people who had no accurate knowledge of anything, but if a bridge or viaduct floor expanded from 30 deg. Fahr. to 80 deg. Fahr., the expansion at this rate on a length of 100 feet was :—

.000006 × 50deg. × 1,200 inches = .36 inches.

Dry and seasoned concrete expanded with temperature rise very much as steel, and with practically the same coefficient. A reinforced concrete viaduct at Sittingbourne was 2,400 feet long, which would represent an expansion of 8½ inches. That would clearly be very destructive if unprovided for.

(*b*) Steel (for example) might be lengthened by pulling it or shortened by compressing it. Within the elastic limit the change of length was proportional to the change of stress, the latter divided by the former being therefore a constant for the material, and known as Young's Modulus of Elasticity. For steel it had the value of E = 30 million lb. per sq. inch. Again, it might seem that the lengthening or shortening by stress inside the elastic limit was so little as to be of no interest to the "practical man." But a steel deck 100 feet long compressed to 9,000 lb. per square inch would shorten by

$$\frac{1{,}200 \text{ inches} \times 9{,}000}{30{,}000{,}000} = .36 \text{ inches.}$$

In flat arches, such shortenings produced considerable fall of the crown and resultant bending stresses unless the arch was three-hinged. But the aspect of the problem to which he wished to draw attention was the interplay between change of length by temperature and stress. There were many places where expansion due to temperature was resisted more or less completely. Suppose, for example, a 100 feet of viaduct floor of steel expanded through 50 deg. Fahr. as in (*a*). That tends to lengthen it by .36 inches if the ends were free. But suppose they were fixed in relatively immovable buttresses. Then the latter pushed it back to its original length, so that the shortening due to compression balances the lengthening due to temperature. Hence the stress developed would be that required to shorten it .36 inches, which was shown in (*b*) to be 9,000 lb. per square inch. In that sense, each degree Fahr. of temperature change produced a stress of

$$\frac{9{,}000}{50} = 180 \text{ lb. per square inch.}$$

With dry seasoned concrete having a Young's Modulus of 4,000,000 lb. per square inch the corresponding figure was 24 lb. per square inch. Hence a change of 50 deg. (if resisted) would produce a stress of 1,200 lb. per square inch or double the L.C.C. figure permissible in compression. If the change was towards lower temperatures it would produce tensile stresses greater than the ultimate and cracks would result. From this aspect, the compressibility under stress enabled materials to withstand change of temperature when confined or restrained. The lower Young's Modulus, the smaller would the resultant stresses be. In the case of concrete, however, the strength and the Young's Modulus rise and fall together * so that a given temperature rise would produce the same proportion of ultimate strength whatever the strength of the concrete.

One form of restraint was common, namely, that imposed by the inside of the block on its exposed surface. A wall might have its outer surface exposed to frost at one time and hot sun another, while the inside remained practically at the same temperature. That might easily produce stresses sufficient to produce cracks.

II. Porous but Seasoned Materials.—These were represented by timber, concretes, bricks, etc., which had been seasoned long enough to acquire constant volume consistent with the conditions under which they were seasoned. In the case of timber and concrete, a year or two were required: more was better, less was better than nothing. That bracketting together of timber and concrete might seem strange, but the more we learnt about concrete, the closer became that similarity of properties. Those materials, when seasoned, expanded and contracted with temperature and stress—(*a*) and (*b*) as in Section I.

(*c*) But a third condition, producing change of length, was introduced, namely, *change of humidity*. Timber, however long seasoned, would absorb moisture and expand if immersed. What was perhaps more remarkable, it would do so if exposed to an atmosphere of greater humidity than that at which it had been kept. Thus a timber seasoned in an atmosphere of 30 per cent. humidity absorbed moisture from the air if exposed to air at 60 per cent. humidity, and expanded in doing so. That was remarkable, when it was realised that 60 per cent. humidity air had no free moisture, the water existing only as water vapour—the air was well below the dew point when the water was deposited on non-porous surfaces. Hence the importance of seasoning woods to the humidity conditions they were likely to be exposed to afterwards, and of keeping down the humidity of buildings by warming them while wood block floors were being laid.

Concretes, and bricks, had those properties also in proportion, as they were porous. Thus, a well-seasoned ordinary 4 : 2 : 1 ballast concrete (*i.e.*, made with impervious sand and aggregate) expanded about .00025 on immersion. That represented .3 inches in a 100 feet, that was to say, of the same order as that produced by a change of temperature of 50 deg. Fahr. (see (*a*)) or a stress of about 1,200 lb. per square inch (see (*b*)). Consequently, what was said previously about stresses and cracks produced by expansion or contraction by change of temperature applied equally to expansion and contraction due to moisture changes.

But the ballast concrete to which reference had been made represented a relatively impervious concrete. If we made concretes of porous materials, they expanded and contracted much more with wetting. As in many problems, the porosity which from that aspect was a disadvantage was associated with corresponding advantages, namely, good "suction"—enabling the plaster to adhere well—and lightness.

But good adhesion could be obtained in other ways. In the Bank of England rebuilding there was being laid, on the centring, rubber sheets with raised square ribs with same size valleys between them. The concrete floors were cast on that of impervious concrete. After the centring was struck, those sheets were pulled off for re-use, leaving a perfect key for render or plaster.

As compared with the coefficient for concrete (.00025) natural stones range from .00004 for Hopton Wood (one-sixth) to York Stone .0005 (double) along a horizontal bed. Portland was about .0008 (about one-third). There was little doubt that the relatively low humidity expansion of limestones such as Portland accounted for their comparatively good resistance to a climate with such frequent changes from wet to dry as ours, which was more damaging to sand stones and their greater humidity expansion. The interplay of humidity, stress, and temperature movements were somewhat similar to those of the two we studied for impervious materials.

A piece of concrete warmed expanded through rise of temperature, but at the same time lost moisture, and suffered contraction in consequence. Similarly on cooling, it contracted from reduction of temperature, but absorbed water vapour by coming in contact with air of lower percentage humidity.

III. Porous Unseasoned Materials.—Examples of these were newly sawn timber and recently cast concrete. All such materials were subject to changes of length previously discussed, due to changes in (*a*) temperature, (*b*) stress, (*c*) humidity, which were all directly proportional and reversible, *i.e.*, they could be repeated in either direction. But they were also subject to two others : (*d*) shrinkage on seasoning and (*e*) plastic yield. Both depended on the duration and age and were irreversible.

(*d*) *Shrinkage on Seasoning.*—Timber, in seasoning, shrunk so much as a quarter of an inch in a foot across the grain. Door panels of partially seasoned timber often showed half that shrinkage. Timber shrunk in seasoning much more than it would subsequently expand, even when immersed, showing that the change was irreversible. Similarly, concrete on hardening shrunk enough to produce "shrinkage cracks" when restrained. That was not to be confused with shrinkage on drying, the former being irreversible, and the latter, as we had already seen, reversible.

(*e*) *Plastic Yield.*—If a perfectly elastic material was loaded it deformed, but when the load was removed it returned to its original shape. Well-seasoned timber and steel (stressed inside the elastic limit) approximated to elastic materials. Thus a steel girder, when reasonably loaded, deflected, and the deflection remains steady however long the load remained on it. When the load was removed the beam returns to its original shape. Well-seasoned timber did the same. Unseasoned timber behaved quite differently. A beam of it, when loaded, deflected when the load was first applied, but went on increasing its deflection as time elapsed, relatively fast at first, more slowly later as the timber became more seasoned. The deflection might be divided into two parts : the deflection which occurred when the load was first applied, and the remainder which depended on the time element. The former was called the elastic deflection, the second the "plastic

* E = 1.000 × strength of cubes.
=1,430 × strength of cylinders having a length twice the diameter.

yield." If the load was removed after a long application, the elastic deflection disappears and the "plastic yield" remained as a permanent set. This was well understood by builders and timber merchants who, when setting planks of valuable woods to season, carefully levelled them up, plank by plank, knowing that any bending would become permanent.

Exactly the same thing happened with recently cast (or unseasoned) concrete. As that was comparatively recently established on a scientific basis, said the lecturer, he might perhaps be excused for referring briefly to some research of his on this subject. He had four similar beams of reinforced concrete made up and loaded so that beam 2 was loaded more than 1, and so on with Nos. 3 and 4, the stresses being calculated. At the age of four weeks they were "struck" and loaded, the deflection then being measured. The load was left quite steady, and the beams were watched for a year. Had the beams been elastic (as steel) no increase in deflection would occur. Actually the deflection increased.

This result had nothing to do with shrinkage, because the top and bottom would shrink together, and no warping would result. This was verified by keeping beam 4 quite wet after the thirtieth week. The curve showed this had practically no effect. Beam No. 3 had part of its load removed at thirty weeks and replaced a few weeks later. The curve showed that the proportionate elastic deflection disappeared and reappeared, leaving the whole "plastic yield" as a permanent set.

Without going into tiresome details and calculations it might be stated that careful analysis of those results enabled the shrinkage, elastic strain, and plastic yield of the top to be separated for each beam.

From these facts a few interesting points resulted. (1) A structure composed of seasoned precast blocks was less likely to crack than one of *in situ* concrete, because while both were subject to contraction with drying and cooling, the *in situ* had the shrinkage in seasoning additionally. (He referred, of course, to precast blocks of the same quality as the *in situ* and not to some of the very porous blocks made by certain block-making machines with semi-dry concrete.) There was another reason for that superiority. When concrete set, the chemical action produced heat and rise of temperature. In the Bank of England underpinning there was a retaining wall 8 feet thick of ordinary concrete. A thermometer buried in the heart of that indicated a rise of 50 deg. Fahr. in three days (i.e., from 50 deg. to 100 deg. Fahr.). The shrinkage would therefore include that due to cooling down from these considerable temperatures. If deposited in thick masses where the heat was not readily dissipated, very serious cracks would result in *in situ* work, but in block construction, all that expansion and subsequent contraction could occur without restraint, and the seasoned article set when those movements were completed. That did not apply, of course, to structures which were free to expand without restraint.

(2) Seasoned blocks of stone or concrete having a small expansion on immersion were, other things equal, likely to stand much longer before decaying than those having a large expansion. In that respect, limestones were generally better than sandstones.

(3) Many structures of precast blocks (particularly brickwork in lime mortar) formed their own expansion joints, whether visible or not, in the mortar joints. That enabled the surface to expand or contract with relatively little restraint. That surface protected the inner body of wall from great changes of humidity or temperature.

(4) It was doubtful whether, in view of those considerations, the monolithic conception was quite as attractive as before those were understood. A small specimen might be cast as a monolith, because its restraint was small, and it was free to shrink without cracking. But a large structure was heavy and required great forces to move its ends.

(5) The raked-out joints, thought perhaps to be a survival of an old custom of doubtful justification, or an architectural fad, acquired a new significance.

(6) Chimneys, and other structures having to resist considerable temperature changes as well as stresses due to wind and weight, were more liable to crack. In brickwork the cracks might be so small and frequent (every joint) as not to be noticeable, while in concrete they were likely to occur less frequently (generally at each construction joint, say, 3 feet apart) and consequently larger and more noticeable. Concrete chimneys were best arranged with a lining to the top, to provide differentiation of function, the lining resisting heat and no wind pressure, the outer shell vice-versa.

(7) Reinforced floors and beams, in view of "plastic yield," should have the centring left up as long as possible, and the longer they could be kept unloaded the better. The fact that the concrete did not fail when the centring was struck was not everything and permanent deflection was minimised by allowing the concrete to season as long as possible before it was stressed. Some movement in concrete structures might proceed under load for quite long periods. Those were not necessarily dangerous, and might only show that the concrete was seasoning normally.

(8) Nothing in the paper, said the lecturer, was intended as a criticism of reinforced concrete. That material could be designed to meet all the conditions required. But it was often designed without much regard to them (especially in commercial competitive designing) and then cracks resulted and (sometimes) decay set in.

(9) *In situ* concreting was best done in lengths with definite rebated joints between sections. If alternate sections were cast first, nearly half the shrinkage could be taken up before the last sections were cast. Better still was to cast the structure in sections with only quite narrow joints left between them, which were cast last, as late as possible. In that way most of the shrinkage due to setting could be eliminated. In some strong room work at the Bank of England rebuilding, with very rich concrete, where the problem was accentuated, that was successful where ordinary methods had produced objectionable cracks.

(10) Interesting problems arose in connection with floors heated by hot water in embedded pipes (sometimes misnamed "Panel Heating"). When he first applied this, said the lecturer, he had some anxiety on the score of its effect on the structure. But further consideration showed this to be unfounded. Water in these pipes did not usually exceed 130 deg. Fahr. and probably the pipe did not exceed 120 deg. Fahr. The actual concrete floor was not heated to over 100 deg. Fahr. The expansion of the concrete was, therefore, of the order of 50 deg. Fahr., and amounted to .36 inches in 100 feet. That only balanced the seasoning shrinkage of the concrete floor (also .36 inches in 100 feet).

(11) Expansion joints, however, might introduce difficulties of their own if they were not designed with great care.

(12) The problem of large flat roofs was an interesting one. Many manufacturers of waterproofing liquids for concrete were so confident that they could make concrete watertight that they had frequently proposed to eliminate asphalt or its equivalent if their compound was used in connection with the concrete. There was, of course, no difficulty whatever in making concrete watertight, but a large flat roof would inevitably crack owing to the combined action of seasoning shrinkage and the other expansions and contractions to which it was subject, and unless very special provision was made to leave complete freedom by dividing it up into sections with complete freedom it invariably cracked and none of those ordinary waterproofing compounds were therefore any good for that purpose. What was required was a material which would either prevent concrete cracking under those conditions or, alternatively, a material like asphalt which would stretch across the cracks without itself cracking.

Discussion.

Mr. Alan E. Munby, in proposing a vote of thanks to the lecturer, said that the idea of plastic yield gave rather a shock when one thought of what might happen if a beam—through pressure of time—were to be loaded before it was ready. He was particularly struck with the device used at the Bank of England for giving a keying to concrete—namely, the ribbed rubber strips. He would like to warn young architects against the danger of plastering on to a concrete surface that was not adequately prepared—especially in the case of ceilings.

Mr. W. E. Vernon Crompton, in seconding, said that it was essential that architects should keep in touch with scientific developments if they were to serve the public faithfully. It was more easy than in the past, now that the Building Research Station at Watford conducted so much invaluable research. Dr. Faber had given a bird's-eye view of what a small section of fundamental research could mean. It would be interesting to know how plastic yield affected the integrity of the union of steel and concrete.

Sir Herbert Baker, A.R.A., felt that it was a blow to him to learn that the possible age of a new architecture, the monolithic, was impossible. However, he hoped Dr. Faber would help them to make buildings as megalithic as could be. He was glad to be there to give his meed of thanks to engineers, civil, structural, etc., in general, and to Dr. Faber in particular, for the help they had afforded to architects. To those who had given their lives to art, art got longer, and the less energy one had to give increased attention to science. For that reason architects owed a debt to the engineers. Sir Herbert referred briefly to the effect of the sun on his Indian and African buildings, and mentioned that special precautions were taken.

Mr. L. Sylvester Sullivan said that Sir Herbert Baker had spoken of the effect of heat on buildings in Africa and India. He wondered what was brought about in Canada, where intense cold was experienced. He felt they must have some very difficult problems to solve there.

Mr. Wilson recalled the fact that older engineers were reluctant to take up reinforced concrete. If they had known of the difficulties that were now realised, it was doubtful whether they would have persevered. As an engineer, he would like to put in a plea for the claims of lime-mortar, which—as well as cement—was good.

Mr. H. V. Lanchester said that he was interested in Sir Herbert Baker's remarks about India. He himself was a traditionalist, and in India it was a good scheme to follow the building customs of the country.

Mr. Dangerfield had recently returned from Kenya, where, in houses built with concrete blocks, they had had trouble from cracking. In Kenya they had sudden changes, from extreme dryness to extreme wetness. They found in concrete blocks crackings similar to monolithic cracks. He wondered if the mortaring which welded the blocks together produced a monolithic effect.

Mr. P. J. Waldram said that Dr. Faber's paper had given food for thought. He was interested in the subject of plastic yield. It was no slight matter, and the Report of the Building Research Station on the subject was awaited with anxiety. He felt that, with regard to the building of steel-frame structures, it might be possible to effect great economies if, instead of providing the necessary strength wholly in the steelwork and using the concrete merely as a filling, the actual strength of the concrete, which was very great, were included in the calculations.

Dr. Oscar Faber briefly replied, and a hearty vote of thanks was accorded to him.

[A list of the R.I.B.A. prize-winners will be found on page 108.]

EASEMENTS OF LIGHT

MODERN METHODS OF COMPUTING COMPENSATION.

By JOHN SWARBRICK, F.R.I.B.A.

Explanatory and Historical Review.

IT IS now generally known that within the last few years an entire revolution has taken place in the methods of computing compensation due in respect of loss of ancient light, both in Court and in arbitration, but it is not so widely known that these new methods were not used in connection with a reported case in Court prior to 1922. In the case in question, the respondents alone were able to submit scientific evidence on modern lines, which enabled them to obtain a judgment with costs. The effect of this and of other more recent judgments has been to convince even the most conservative solicitors that it would be a sheer waste of their clients' money to attempt to submit cases in the primitive and inadequate manner adopted in pre-War days. At that time it was customary, as most of us can very well remember, for expert professional witnesses to submit to the Courts, on behalf of both the plaintiffs and defendants, diagrams showing the angles of unobstructed sill light obtainable both before and after the erection of a new building. The inferences to be drawn were then usually stated by the expert witnesses of the claimants to be of a most serious nature, so serious in some cases as to be incapable of adequate compensation, an injunction to restrain being the only remedy. On behalf of the respondents, other expert witnesses would subsequently be called and state that the deprivation of light would not be of anything like so substantial a nature as had been alleged; and that, in their opinion, in view of the decision of the House of Lords in the case of Colls *v.* Home and Colonial Stores, Ltd., the main question to be considered was not how much light had been taken away, but how much remained. Such witnesses usually expressed the view that the infringement did not amount to a legal nuisance and that it would be oppressive to grant an injunction. The Court doubtless realised that these were the considered judgments of men of integrity, desirous of being conscientious, although their opinions were so entirely opposed to one another as to be valueless.

Figs. 1, 2 and 3 illustrate drawings of the kind formerly submitted in Court, in support of evidence. These are copies of the actual drawings attached to affidavits in the case of Colls *v.* Home and Colonial Stores, Ltd., and are reproduced from Vol. 1 of "The Architects' Law Reports," 1904.

No doubt the former Vice-Chancellor of a provincial Chancery Court realised the uselessness of unscientific evidence when he adjourned a certain well-remembered right of light case in which the opinions of experts had been contradictory. During the interval, his Honour personally visited the premises of the plaintiff unexpectedly, rapidly made his own observations and formed conclusions, which he duly announced in pronouncing judgment. The Vice-Chancellor evidently found that the technical evidence did not assist him and that his only course was to proceed independently. Such a test as he made was, of course, only possible in cases in which the building had actually been erected; it could not have been tried in the case of an application for an injunction to restrain the proprietor of a building in course of erection. Unfortunately, the eye is not a reliable photometer. It adjusts itself quickly and unconsciously to changed conditions, and the sky brightness may change very considerably without the eye being able to form a reliable estimate of the extent of the variation. If, for example, a capable observer should view premises during the bright midday lunch hour he might form a completely erroneous idea of the extent to which the interior of the building, as a whole, had been injured during periods when the illumination from natural sources was more normal

Whilst it is now generally understood that modern scientific methods have been largely used in recent cases, comparatively few seem to know definitely the precise nature of the methods adopted. Some even have been known to state that the new methods seem to them to be too theoretical to have any practical value, whilst admitting that they sound very convincing and appear to be appreciated in the Courts. But those who will take the pains to investigate the matter will find that the methods now adopted are neither purely theoretical nor at all difficult to understand. The drawings used are, in fact, of the simplest possible nature and obviously take the form best adapted to enable the Courts readily to appreciate the facts and so come to fair and impartial judgments. They are certainly in no sense either unintelligible or misleading. It will doubtless be generally agreed before long that no other kind of evidence will ever again have any real value, and those who rely upon presenting their cases in the old-fashioned way will, in the future, probably suffer a profound disillusionment.

Both the Royal Institute of British Architects and the Surveyors' Institution have published communications showing how hemispherical projections of the sky may be prepared for any aspect to show not only the apparent paths of the sun during different months in the year, but also the extent to which existing and proposed buildings either do or would obstruct the available illuminating area of the sky. Although the new methods have been regarded by many practitioners with distrust and suspicion, they are now being much more widely adopted than is generally known. A well-known surveyor recently told me that, on behalf of the freeholders in two of the streets facing an important new building, daylight plans with the exact percentages of skylight plotted upon them were prepared and agreed by both parties before a brick was laid. Moreover, I was informed that compensation was paid upon the basis of these plans. It will therefore be clear that it is possible to predetermine the effect of proposed buildings on the lighting of particular floor areas so exactly that compensation for injury can be definitely assessed. In the same way, lighting conditions that existed in buildings now demolished can be ascertained. As it will be realised, the settlement of easement of light disputes in a scientific manner is far more businesslike and much more in public interest than the former method of trusting to the opinion of experts, without any exact data. Light cases, owing to the conflict of evidence of men too prominent and conscientious to be ignored, were usually very costly, and the results largely problematic. In the old days, the evidence submitted to the Courts generally consisted for the most part of the usual plans, elevations, and sections, often showing widely differing angles of light, according to the points at which they were taken. With such imperfect data the witnesses expressed views that were mainly matters of opinion. When the facts can be presented in a precise and simple form about which no two opinions can be held, cases are frequently settled between counsel as soon as the issues are defined. Still more frequently cases do not find their way into Court at all. The two main advantages of the new methods may,

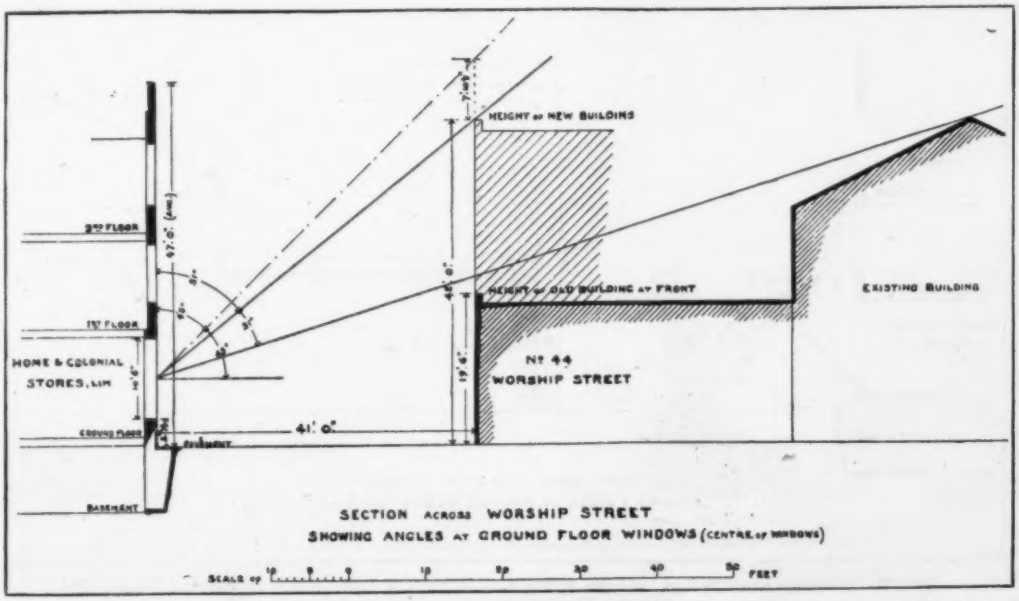


FIG. 1. Drawing submitted as evidence in the case of Colls v. The Home and Colonial Stores, Ltd. (From "The Architects' Law Reports.")

therefore, be said to be (a) that the results are exact and incontrovertible, and (b) that they are capable of definite pre-determination. The material placed before the Court usually consists of Daylight Plans of each interior affected, upon which are drawn shaded isoluminous contour lines of equal daylight factor showing the disposition of good, adequate, and inadequate light, under dull, but not abnormally dull, weather conditions, both under the original conditions of obstruction and under the conditions of obstruction proposed. Typical Daylight Plans are shown in Figs. 5 and 6.

In addition to bright diffused light from the sky, such as may be seen from rooms with a northern aspect, windows looking in an eastern, southerly or western direction often enjoy a considerable amount of direct sunshine. In order to record the extent to which a window may be deprived of sunlight, the apparent paths of the sun at varying times of the year are now shown on flat projections of the hemispherical dome of the sky. On these drawings the hours of the day are also indicated. When the extent of the existing structures or of former structures and of the proposed buildings have been projected on to these sheets, anyone may readily see the hours of day at various times of the year, when the sun might be seen from a particular window, under both the original and ultimate conditions. The apparent paths of the sun vary with the latitude of the building under consideration, and this variation is so appreciable that a solar diagram for a certain aspect in London would not be correct for the same aspect in Manchester. A diagram indicating the maximum angles of altitude of the sun, at the meridian, on the 21st of each month of the year, at both London and Manchester, will be found in Fig. 7.

Although the first accurate sky projections and Daylight Plans to be used in a reported case at Court were only submitted by Mr. Percy J. Waldram so recently as 1922, more than sixty years ago certain well-known architects realised that loss of light must be measured on a spherical basis. In his evidence, in 1865, in the case of Stokes *v.* The City Offices' Company, Mr. E. I'Anson, a distinguished London architect, stated that "the quantity of light which passes through any given window must depend upon the sky-surface which is visible therefrom, or which gives or reflects light thereto." In this view Professor Robert Kerr was in complete agreement with him. During the same year Professor Kerr published his treatise on the subject, and, in the following year, 1866, read to the Royal Institute of British Architects his paper entitled "Remarks on the Evidence of Architects concerning the Obstruction of Ancient Light, and on the Practice of Proof by Measurement; with reference to recent cases in the Courts of Equity." Amongst the illustrations to this paper were two to which I wish to call special attention. These will be found reproduced in Figs. 8 and 9. Fig. 8 was described as a "Circular Projection," and Fig. 9 as a "Square Projection." Crude and

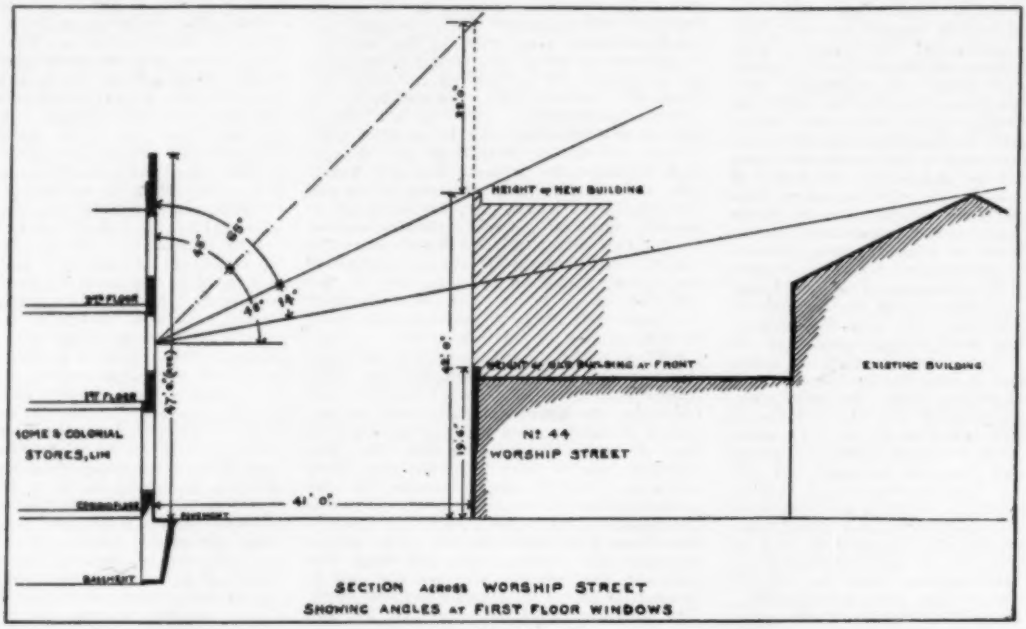


FIG. 2.

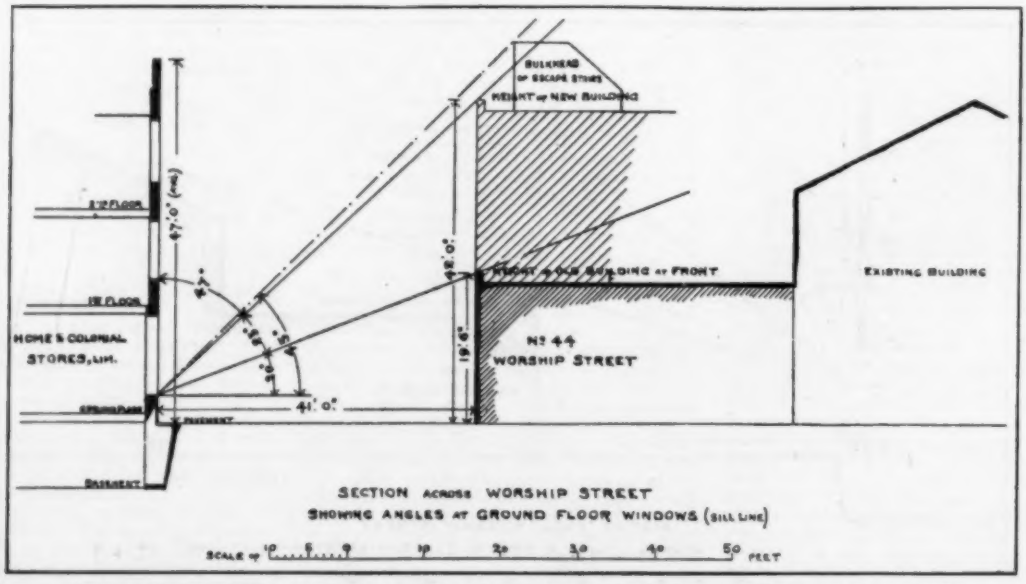

BULKHEAD OF ESCAPE STAIRS
HEIGHT OF NEW BUILDING
2ND FLOOR
1ST FLOOR
HOME & COLONIAL STORES, LIM.
GROUND FLOOR
BASEMENT
41' 0"
HEIGHT OF OLD BUILDING AT FRONT
EXISTING BUILDING
Nº 44 WORSHIP STREET
SECTION ACROSS WORSHIP STREET
SHOWING ANGLES AT GROUND FLOOR WINDOWS (SILL LINE)
SCALE OF 10 5 0 10 20 30 40 50 FEET

FIG. 3. Drawings submitted as evidence in the case of Colls *v.* The Home & Colonial Stores, Ltd. (From "The Architects' Law Reports.")

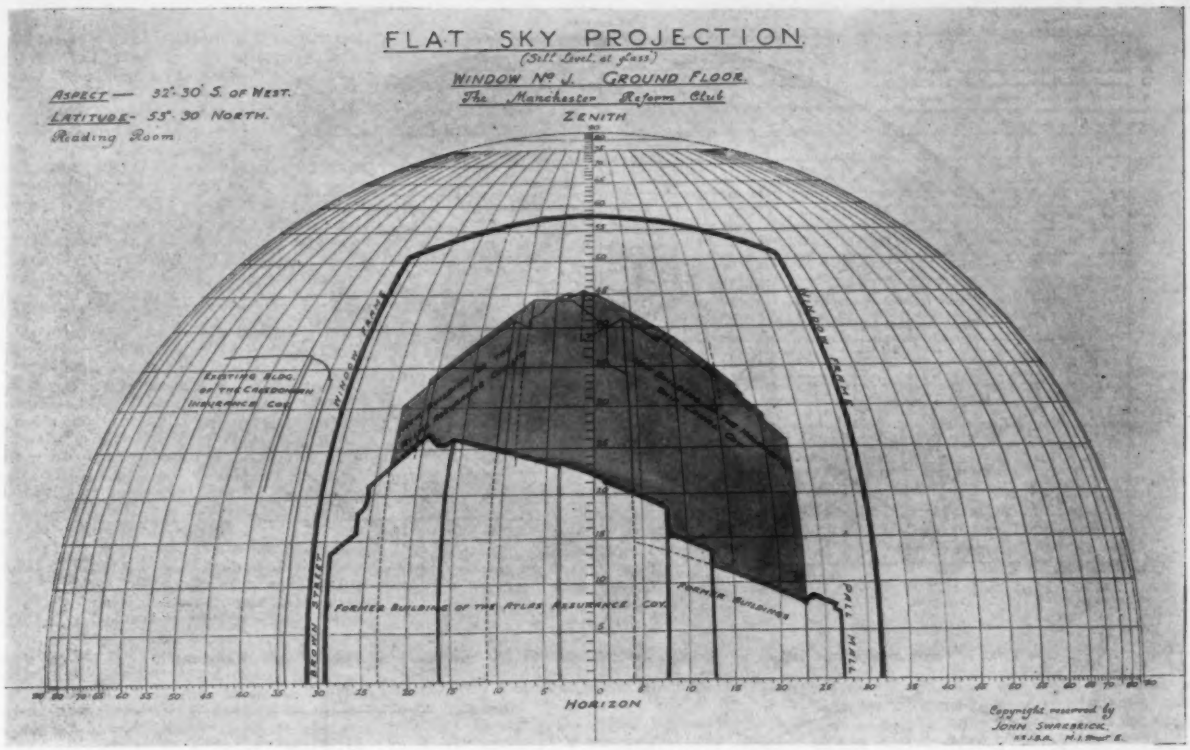


FIG. 4. A Typical Sky Projection, showing the effect of new buildings in Manchester.

imperfect as these diagrams may be, they nevertheless bear some slight resemblance to a modern Sky Projection and to a Calculating Diagram, to which reference will be made later. It should, however, be pointed out that Professor Kerr's Square Projection did not represent graphically the actual relative values of light, in accordance with the cosine law of light as a modern Calculating Diagram does. It will be observed that the Professor chose to represent the spherical dome of the sky in plan and not in elevation, as in most modern Sky Projections. There is, however, no reason why a modern Sky Projection could not be so prepared, and when little more than zenith light has to be considered, a plan of the sky would be more helpful than an elevation, owing to the foreshortening that naturally occurs in the projection of a spherical surface on to a flat sheet of paper. The only fear is that a plan of the sky surface might not be so easily understood as an elevation.

The sky, said Professor Kerr, might be considered as equivalent to a vast reflector, every point of which yielded its equal share of lighting to the window in question. The window light, he suggested, should be measured by means of the "sky-surface." This he attempted to do by assigning the lighting values figured on his circular and square projections to the parts of the sky indicated. The whole procedure was exceedingly primitive, but the general idea was there. When he had proceeded so far, he considered that, up to this point, he had only arrived at the means of ascertaining the comparative abstraction of lighting power, and that this would be of no service unless the relation of the size of the window to the size of the room, and of both to the amount of lighting power possessed, could be introduced into the calculation. At this

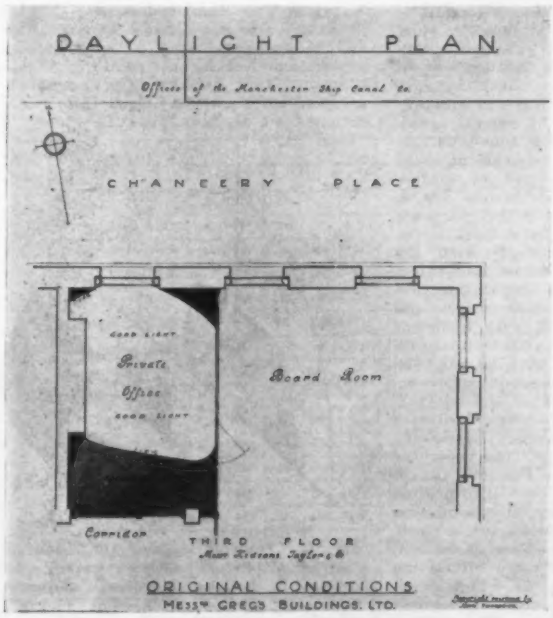


FIG. 5. A Typical Daylight Plan.

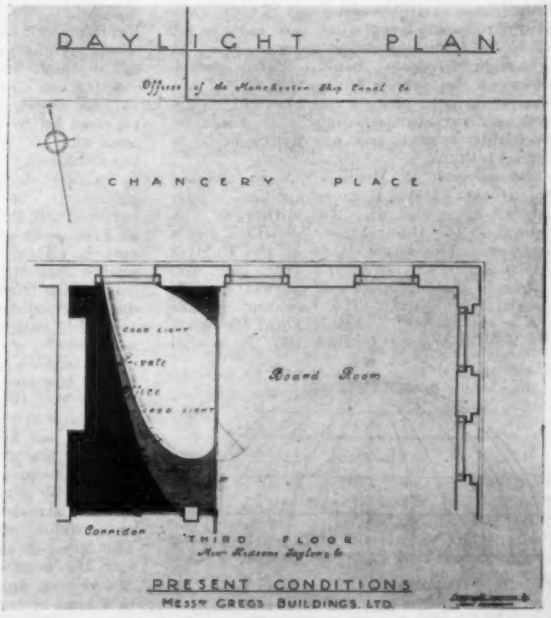


FIG. 6. A Typical Daylight Plan.

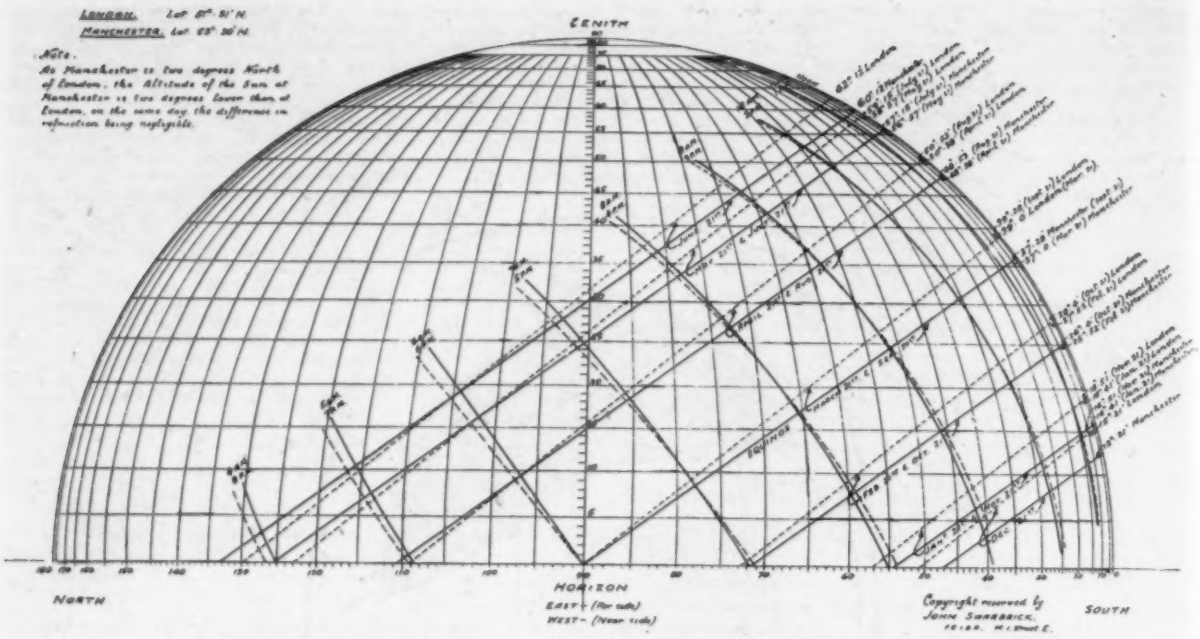

LONDON. Lat 51° 31' N.
MANCHESTER. Lat 53° 28' N.
Note.
As Manchester is two degrees North of London, the Altitude of the Sun at Manchester is two degrees lower than at London, on the same day the difference in refraction being neglegible.
ZENITH
HORIZON
EAST (For side)
WEST (Near side)
NORTH
SOUTH
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FIG. 7. The Maximum Angles of Altitude of the Sun, at the meridian, at London and Manchester.

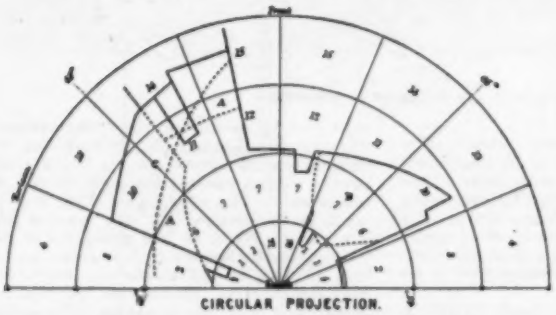


FIG. 8. "Circular Projection." Professor Kerr's Method. (Now superseded.) (From the "Transactions" of the R.I.B.A.)

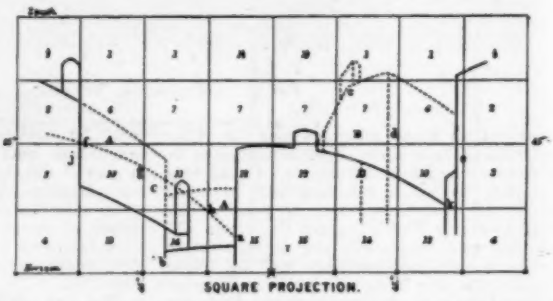


FIG. 9. "Square Projection." Professor Kerr's Method. (Now superseded.) (From the "Transactions" of the R.I.B.A.)

stage we may leave the Professor, involved in the ramifications of his own system. Complicated and unscientific as it may have been, Professor Kerr used this method as the basis of his evidence in a number of right-of-light cases which were widely known at the time. Apparently it did not occur to him to plot on the plans of rooms the exact ratios of sill light that would be obtainable, as it is now customary to do in Daylight Plans.

The methods of Professor Kerr aroused the interest of Mr. Homersham Cox, a barrister-at-law, who was the author of "A Manual of the Differential Calculus," and a work on "The Institutions of the English Government." In June and July, 1869, Mr. Cox wrote, for a professional journal, a series of articles entitled, "The Law and Science of Ancient Lights." These formed the basis of a book bearing the same title, the second

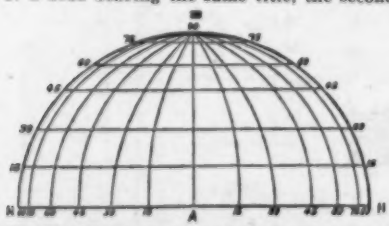


FIG. 10. Flat projection of a quarter sphere of sky. (From "The Law and Science of Ancient Lights," by Homersham Cox, M.A., Second Edition, published in 1871.)

edition of which was published in 1871, with the inscription, "The Law and Science of Ancient Lights, by Homersham Cox, M.A., Barrister-at-Law." In the preface, Mr. Cox wrote: "The papers of 1869 gave some general methods of calculating the amount of obscuration produced by buildings of various dimensions; but it was subsequently represented to the author by several architects that it would be very convenient to have tables by which the obscurations could be calculated without the aid of mathematics. The forms of structures are so various and irregular that it did not seem at first sight easy to comply with this suggestion. However, upon consideration, the author has been able to devise and calculate tables from which the obscuration produced by buildings, whatever their form and position, can be computed with sufficient accuracy by a very simple arithmetical process. In this part of the work he has been kindly assisted by an excellent mathematician, Mr. Haynes, Fellow of Queens' College, Cambridge, who has favoured him with several valuable suggestions." Glancing through the illustrations of this book, the reader is sure to observe Fig. 10, and to notice how it resembles a modern projection of the quarter-sphere of sky to be seen from any window, with an unobstructed horizon. The letter Z at the top is intended to indicate the zenith. An even more interesting illustration appears in Fig. 11, which shows in a kind of isometric projection the method of producing the extent of an obstruction on to the imaginary surface of the sky, and then from that on to a flat surface corresponding to a modern sky projection. These diagrams were described as orthogonal projections. The resemblance between Fig. 11 and the corresponding drawings made by modern methods is too striking to escape notice. How far Mr. Cox advanced on accepted lines may be judged from two quotations from his book. In it he wrote: "For

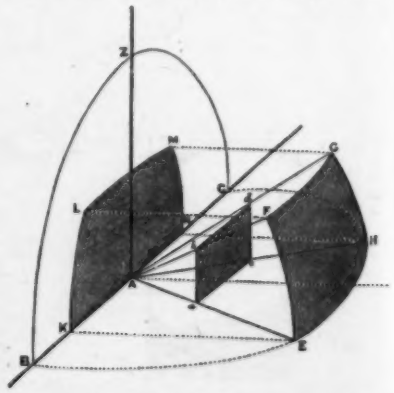


FIG. 11. Drawing showing the extent of an obstruction produced on to a quarter sphere of sky and a flat sky projection. (From "The Law and Science of Ancient Lights," by Homersham Cox, M.A., Second Edition, published in 1871.)

the purposes of calculation it is ordinarily assumed that the sky is uniformly illuminated, and that hypothesis will be here adopted." Again, we find these words: "First, for the sake of simplicity, suppose that the aperture is a skylight or opening in the horizontal roof of a building, with no obstructions above its own level. In that case, the opening is illuminated by rays from every part of the sky, which is regarded as a concave hemisphere."

"Next, consider the case of an unglazed aperture in a vertical wall, erected on a horizontal plane—such a case as that of windows in the vertical wall of a house on the seashore, on the level of the sea and directly facing it. In this instance, each point of the aperture may be considered to be the centre, not of a hemisphere but of a quarter of a sphere of light."

Generations of practitioners have studied this book and attempted to apply its tables, but in the absence of further developments in the methods of procedure the Courts have remained without the definite data that have now been made available. In his book, Mr. Homersham Cox alluded to the earlier works of Professor Kerr, in these terms: "Mr. Kerr wholly neglects the fundamental principle of diminution of intrinsic illuminating effect due to obliquity of rays, and his calculations are utterly at variance with the principles of optics and geometry, and are not in any degree approximations to correct results." In consequence of these remarks, the Professor desired Mr. E. Wyndham Tarn, M.A., an Associate of the Royal Institute of British Architects, to investigate the subject from a purely mathematical point of view, and the results of his labours were printed by the Royal Institute, in a paper entitled: "On the Admeasurement of the Sky in Cases of Light." In his calculations, Mr. Tarn sought to determine the relative illuminating power of various portions of sky-surface on the surface of a vertical window and not on the horizontal plane, at table level, within a room, as in a modern Daylight Plan. He did, however, prepare his table on two hypotheses. First, he assumed an equal diffusion of light from all parts of the sky, and then, in subsequent calculations, he regarded the light as increasing from the horizon to the zenith as the sine of the angles of altitude. The tables which he prepared are reproduced by permission of the Council of the Royal Institute of British Architects, from the "Transactions." In Fig. 12 we have the relative values of light entering a vertical window from different parts of the sky surface, on the hypothesis of an equal diffusion of light, and, in Fig. 13, we have a similar table, on the hypothesis of a variable diffusion of light, increasing in illuminating power from the horizon to the zenith as the sine of the angle of altitude.

Value of each Zone		0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°
206	10	21	21	20	19	18½	17	15	15	13	12	10	8	6½	5	3	1	
492	10	51	49	46	45	44	41	38	36	31½	28	24	20	15½	11	6½	2½	
826	40	85	83	81	77	74	69	64	60	53	47	40	33	26	19	11	4	
1214	50	125	122	119	113	109	101	94	86	78	69	59	49	38	29	18	6	
1628	50	♎ 167	164	160	152	146	136	126	116	104	93	79	65	51	37	22	6	
2034	50	♏ 210	205	200	190	183	170	158	142	131	116	99	82	64	47	27	10	
2375	40	♐ 244	239	233	221	213	198	184	172	152	135	115	95	75	55	32	12	
2697	40	♑ 278	271	264	251	242	225	209	195	173	154	131	108	85	62	36	13	
2775	10	☉ 286	279	272	259	249	232	215	202	177	158	134	111	87	64	37	13½	
2814	10	♒ 290	283	276	262	252	235	218	204	180	160	137	112	89	65	37½	14	
2711	50	♓ 279	272	266	253	245	226	210	197	174	154	131	108	85	62	36	13	
2469	50	♈ 254	248	242	230	221	206	191	179	158	143	120	99	77½	55½	33	12	
2091	50	215	210	205	195	187	175	162	152	134	119	101	84	66	48	28	10½	
1587	50	163	160	156	148	142	133	123	115	102	90	77	63	50	36½	21	7½	
1007	40	104	101	99	94	90	84	78	73	65	57	49	40	32	23	13	5	
362	0	37	36	35	34	32 H	30 O	28 R	27 I	23 Z	21 O	18 N	15	11	8	5	2	
27288 = total value of half sky-surface.																		

FIG. 13. Table, prepared by Mr. E. Wyndham Tarn, to show the relative values of light entering a vertical window from different parts of sky-surface, on the hypothesis of a variable diffusion of light, the illuminating power increasing from the horizon to the zenith as the sine of the angle of altitude. (Segments measuring 5 degrees each way.) (From the "Transactions" of the R.I.B.A.)

About thirty years after Professor Kerr read his paper at a meeting of the Royal Institute of British Architects, Mr. James Dod, a former surveyor to the Liverpool Exchange, adopted a somewhat similar method for determining the value of obstructed light. These diagrams were used by him in several right of light cases. They were also, it is stated, used to show the effect of the proposal to roll back the Liverpool Town Hall, in the manner suggested by certain Americans. So far as it is known, Mr. Henry B. Molesworth, M.Inst.C.E., the author of "Obstruction to Light," published in 1902, was the first to indicate on sky projections the apparent solar paths at various times of the year. In this publication he showed how the position of the sun might be ascertained at any hour of the day at all seasons of the year on a "planisphere," which is only another name for a sky projection. It was left for Mr. P. J. Waldram, with the assistance of improved photometers, to develop modern methods of procedure. It must not, however, be imagined that Mr. Waldram was merely following in the footsteps of the pioneers to whom I have referred. He has, in fact, informed me that his investigations were conducted quite independently and without any knowledge of the earlier work of Professor Kerr, Mr. E. Wyndham Tarn, and others. The public are, I believe, entirely indebted to Mr. Waldram and his son for the introduction of the form of calculating sheet now in use, which represents graphically, in a simple chart, the relative values of light, increasing in value from the horizon to the zenith, in accordance with the cosine law of light. An illustration of a calculating sheet will be given next week.

Value of each Zone		0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°
206	10	21	21	20	19	18½	17	16	15	13	12	10	8	6½	5	3	1	
469	10	48	47	46	44	42	39	36	34	30	27	23	19	15	11	6	2	
826	40	85	83	81	77	74	69	64	60	53	47	40	33	26	19	11	4	
1258	40	130	127	124	115	110	106	98	92	81	72	61	50	40	29	17	6	
1775	50	♎ 183	178	174	165	158	148	138	129	114	101	86	71	56	41	24	9	
2346	50	♏ 242	235	229	218	209	195	181	170	150	133	113	93	74	54	31	11	
2969	50	♐ 306	300	293	278	268	249	231	217	193	170	145	119	94	69	40	15	
3604	50	♑ 372	363	354	337	324	302	280	262	232	206	175	144	114	83	48	18	
4177	50	☉ 430	420	410	389	374	349	324	304	268	236	202	167	130	96	56	20	
4730	50	♒ 492	480	468	434	416	387	358	347	307	272	231	191	150	110	64	23	
5351	50	♓ 551	538	525	499	480	447	415	388	343	304	259	214	169	122	71	26	
5645	50	♈ 591	577	563	546	525	489	454	425	376	333	284	234	207	135	78	28	
6299	10	648	633	618	587	564	526	486	456	404	358	305	252	196	145	84	31	
6641	10	673	649	632	620	596	556	516	483	427	379	322	266	209	153	89	32	
6916	0	712	695	676	645	620	578	536	502	444	394	335	276	217	159	92	33	
7024	0	727	710	693	660	634 H	591 O	548 R	514 I	454 Z	403 O	343 N	283	223	163	94	34	
60508 = total value of half sky-surface.																		

FIG. 12. Table, prepared by Mr. E. Wyndham Tarn, to show the relative values of light entering a vertical window from different parts of the sky surface, on the hypothesis of an equal diffusion of light. (Segments measuring 5 degrees each way.) (From the "Transactions" of the R.I.B.A.)

Bridge Design.

Mr. Arthur Keen, V.-P.R.I.B.A., has replied to Sir Owen Williams' letter to the *Times*—given in our issue for December 21, 1928—as follows:—"Sir Owen Williams has given interesting comments on the report of the Royal Fine Arts Commission in his letter of December 18 on the subject of bridge designing by architects or engineers, but the point that he makes in relation to Waterloo Bridge, as being the work of an engineer, is fallacious, because little distinction existed between the two professions when that bridge was built. As a matter of fact, Sir John Rennie, its designer, was one of those who summoned the preliminary meeting in 1834 which led to the establishment of the Royal Institute of British Architects a few months later. Among the others were Barry, Basevi, Hardwick, and Decimus Burton. The engineers who have been considering Charing Cross Bridge and have put forward a plan for it have called particular attention to the need for the collaboration of architects in the work, and this collaboration, to be in any way effective, will have to be applied to the main outlines of the scheme, both for the bridge and its approaches, before any decision is made."

Building Science Abstracts.

Vol. I (New Series). No 11, November, 1928, Abstracts Nos. 1941-2126, has now made its appearance and may be obtained (price 9d. net) from H.M. Stationery Office. In it will be found abstracts of papers primarily of interest to the Building Interest, the teachers of Building Science and the manufacturers of building materials. At the end of each section are grouped abstracts chiefly of interest to research workers. Book notices and references to patents are also included.

THE SURVEYORS' INSTITUTION

CHARING CROSS BRIDGE.

"SOME Notes on the Charing Cross Bridge Problem" formed the subject of a lecture read at the Surveyors' Institution on Monday by Mr. A. Norman Garrard (Hon. Secretary). The lecturer said that the subject of a new bridge at Charing Cross, considered in its widest aspects, raised many important questions of special interest to the surveyor's profession. Perhaps in the first instance it would be well to consider the physical conditions of this part of London. An examination of any topographical map of London and the development of the streets showed that there was nothing special in the lay-out to indicate that a bridge at Charing Cross would form a link between two well-recognised ancient lines of communication on either bank of the river. Owing to the turn of the Thames about the site of Waterloo Bridge, the natural continuation of the lines of communication on the left bank of the river was parallel to the river, and not at right angles to it. It should be remembered that at the time when the existing Blackfriars, Waterloo, and Westminster Bridges were constructed or reconstructed the Victoria Embankment had not been formed, and the Thames at Charing Cross came a considerable way from the present embankment wall towards the Strand. Generally speaking, the Strand was at a level sufficiently high to enable a bridge to be constructed without too severe a gradient, and to give adequate headway over the river. The lecturer dealt briefly with the history of a Charing Cross Bridge which might be regarded as falling into two parts, namely (i) the provision of the present Charing Cross Bridge, and (ii) proposals for its removal and the substitution of a new bridge.

In regard to the question of the removal of the present Charing Cross Railway Bridge, the bridge had from the first been the subject of adverse comment from an æsthetic point of view, and no doubt many had entertained the hope that the day would come when it would cease to be a disfigurement to the fine reach of the Thames which it spans. But it was only after many suggestions and the mooting of several Bills that in 1926 the Royal Commission on Cross-River Traffic was appointed, and reported recommending among other schemes the construction of a double-deck road and railway bridge at Charing Cross. As a result of this recommendation the Ministry of Transport instructed certain engineers to submit a report on the Royal Commission's scheme. In accordance therewith a report dated April 4, 1928, signed by Mr. Basil Mott and Sir George Humphreys was submitted to the Minister of Transport. Following this report negotiations between the various bodies and departments concerned had been taking place, and there for the moment the matter stood.

Before proceeding to the consideration of the case for a Charing Cross Bridge, and of the alternative schemes that have been put forward it would be well, said the lecturer, to obtain an idea of the magnitude of the proposals as indicated by estimates of cost. The estimate of the Royal Commission for the scheme which they recommended was £7,500,000, which with the general addition of 10 per cent. for contingencies which they made would give a total of £8,250,000.

In the report of the advisory engineers to the Minister of Transport on the Royal Commission's scheme, the cost of that scheme with certain amendments which they recommended was estimated at £13,050,000. The cost of an alternative scheme favoured by the engineers was estimated at £10,770,000. The proposal of the Royal Commission was that not more than three-fourths of the cost should be met by contributions from the Road Fund, the remainder being borne by the rates. Even on this basis the cost falling on the rates would be about twice the estimated total cost of a new Waterloo Bridge capable of taking six lines of traffic.

It would be seen from the history of the proposal for a Charing Cross road bridge that it was urged first on æsthetic grounds as a means of removing what was regarded as an eyesore—the present railway bridge—and of providing a bridge worthy of the position in the river. The other consideration, that of traffic, had perhaps, in the mind of some, been a secondary consideration, though all recognised that a fine road bridge in this position would be a valuable additional means of cross-river communication. A third consideration was that of the improvement of the Lambeth side of the river.

The Royal Commission on Cross-River Traffic did not refer at any length to æsthetic considerations in regard to the bridge, but based their recommendations mainly on grounds of traffic. None of the public authorities primarily concerned with London bridges and traffic, however, gave evidence in support of its immediate construction.

As the question of the future position of the railway terminus, and the attitude of the railway company overshadowed any scheme, it would perhaps be best to give consideration first to the question whether the railway terminus should be removed, and, if so, on what terms to the railway company. Charing Cross Station, though not amongst the great railway termini of London, was an important terminus. The Royal Commission did not recommend its removal, apparently on the ground of the prohibitive cost involved in the abolition of the railway. The estimate of the advisory engineers, however, for a scheme involving the transfer of the railway station to the Lambeth side was less than for a scheme which would leave the railway station on the Westminster side. The attitude of the railway company towards the proposal for the removal of the terminus was a matter of great importance. It seemed from what was reported in the Press of the negotiations proceeding that the railway company was prepared to entertain the proposal that its Charing Cross terminus should be removed to the Lambeth side. The important question of the terms and conditions on which that should be done and the necessary property made available for the construction of a road bridge would remain to be settled.

Probably in no scheme of bridge or street improvement, said the lecturer, had there been such a variety of proposals or such a divergence of opinion as that in regard to a Charing Cross bridge. It would perhaps be convenient to begin with the scheme of the Commission itself. The germ of their scheme, they had stated, was provided by the main principles of Captain Swinton's scheme, which has been developed for them by Sir Owen Williams, K.B.E. The summary of the scheme was as follows:—A double-decked steel bridge, with not more than five arches over the river, providing for railway tracks on the lower, or present, level, with a 60-foot roadway above and two footways of 15 feet each, a new Charing Cross Station simultaneously being constructed, on a site to be acquired which was bounded on the east by Buckingham-street. The roadway on the northern side of the bridge should cross over the Strand and pass behind St. Martin's Church, reach the ground level in the vicinity of the Cavell statue, while the roadway on the southern side should pass by Waterloo Station at platform level, where it would branch by two inclined ways, 75 feet wide, down the centres of Oakley-street and Webber-street respectively. This scheme was referred by the Ministry of Transport to engineers, who, from their report, did not seem to be very favourable to it. They added some criticisms of the scheme and recommended that if it was carried out certain modifications should be introduced, the most important of which were:—

(1) The bifurcation of the road approach on the north side of the river with one branch on each side of the station in order to give access to the Strand, and to allow of 28 feet head-room over the whole station;

(2) A deviation to avoid the long tunnel in Waterloo-road;

(3) A branch to Waterloo-road between Waterloo Bridge and Stamford-street.

Moreover, their estimate of cost was £11,720,000, whilst the modifications which they recommended would raise their estimate of the cost to £12,850,000.

The most important indication of the views of the advisory engineers was the fact that though, as they stated, they were only instructed to deal with the scheme submitted to them, they put forward an alternative scheme for a road bridge only, the railway terminus to be transferred to a site at the present Waterloo Junction Station.

Both the scheme of the Commission and the alternative proposal of the advisory engineers were what might be described as "high-level" bridges, that was, bridges with approach viaducts over the Strand at one end and over Waterloo-road at the other. Other possibilities which had been suggested were a "middle-level" bridge like Waterloo Bridge, at its northern end starting from the Strand level and communicating with Waterloo-road and possibly also direct with Waterloo Station on the south, or a "low-level" bridge springing from the river banks without viaducts at either end, like all other bridges in London except Waterloo Bridge at its northern end. It was to be regretted that they were in neither the Proceedings of the Royal Commission nor the report of the advisory engineers any plans of a "middle-level" (Strand level) bridge.

It should not be forgotten, however, that a bridge springing from the banks was the normal class of bridge, and it should not be dismissed solely because it was considered undesirable that two streams of traffic should cross on the level. In such an important matter, the whole effect must be explored, including the effect on property by the treatment of the approaches. On the north there existed an important line of approach in Northumberland-avenue, though a new approach from the Strand would be necessary. On the south it would be necessary to construct an entirely new approach. The whole effect of the various schemes on the districts on both sides of the river, from the point of view of values as well as æsthetic considerations, must be considered and compared.

The elimination on both sides of the river of high-level viaducts would no doubt remove difficulties in the way of the development of sites available for the erection of new buildings in the immediate vicinity of the bridge and its approaches.

St. Mark's, Venice.

Restoration work has been going on in the Basilica of St. Mark's at Venice. A crack had made its appearance in the great pillar in front of the Altar of the Sacrament. In consequence of this, the columns above it had shown a tendency to lean outwards. The architect, Signor Marangoni, succeeded in strengthening the whole structure by injections of liquid cement, leaving the mosaics and marbles intact. Now, however, says the *Times*, Signor Marangoni has before him a much more important and difficult task. When the restoration work which had been going on for some years to the Vaults of the Apocalypse was nearly complete, an examination made towards the Dome of the Pentecost revealed that the pillar which follows the Vault of the Apocalypse, and, together with other pillars, supports the Dome of the Pentecost, was in a very bad state. While the dome weighs 250 tons, this pillar must support about 100 tons of the total weight, which to-day is an excessive burden in view of its present condition.

Earl Haig Statue.

An official announcement concerning the proposed statue in Whitehall to Field-Marshal Earl Haig will be made in the near future by the Marquess of Londonderry, First Commissioner of Works. It is probable that British sculptors will be invited to submit designs for the statue.

PRACTICAL POINTS IN CONSTRUCTIONAL WORK

BY GEORGE KENWORTHY, ASSOC.M.INST.C.E.

THE writer has dealt with the technical side of constructional work in previous articles, and there are so many text-books on the subject that it is not proposed to touch this side of the matter here except in so far as it affects each point or detail referred to. Books, however, do not deal with the side of the subject which is briefly discussed here, and these practical notes should prove a help to young draughtsmen and pupils.

Detail 1.—ANCHORAGE.—Steel stanchions should be erected with anchor bolts which will allow a certain amount of play during fixing of steelwork. For this reason taper draw boxes should be used in setting the bolts as shown in the detail. The first section of concrete is put in to the level of the heads of the bolts, and allowed to set. The bolts, framed up with the boxes and template, are then placed in position, and the second section of concrete poured, keeping them about one inch below the steel stanchion base level for grouting in. Many builders make the mistake of fixing these bolts rigidly in the first instance, and this always causes trouble when the erection of the steelwork is commenced.

Note also that it is not necessary, when erecting on a concrete base, to countersink the base rivets of the stanchion—nor is it good to do so—for snap heads allow of wedges being easily used for adjusting the stanchions as to alignment and level. Countersinking here is simply a throw-back to the days of York stone pads.

Detail 2.—Anchor bolts must be forged from the solid, though, if not so specified, it is quite customary to find these have been welded from short stub ends or shanks. Even if made as per detail, and the head only forged from a strap, the grains are in this case crossing and cut into each other, thus weakening the whole weld.

Detail 3.—This illustrates the necessity of oxter stay bracing at the eaves corners. If the building were a short one it should be noted that the end frames take away the necessity of such bracing. Here also it will be noticed that the necessity of anchor bolts (often not put in) is demonstrated. Note, too, that the foundation pads must be of sufficient weight and resistance to counteract the effect shown. The anchor bolts, too, must have sufficient concrete above them to be effective (Lewis bolts are of no use for this purpose) or they will simply draw like a tooth. Straps at the bottom are necessary. Another point to watch is the tendency to use flat tie-bars for main trusses. If these were angles and consequently stiffer, the truss would throw the horizontal force on to the opposite stanchion as well, and then both would help in the resistance to overturning.

Detail 4 shows a properly held base. With regard to the design of the stanchion, it should be noted that it is necessary to treat it as a combination of a pillar and cantilever. Text-book tables simply give tables for pillar loads. These tables must only be used with knowledge and discretion.

Detail 5.—It will be noticed that if oxters are used, the leverage for bending on the stanchion is practically doubled, and the stanchion strengthened accordingly. It is equivalent to making the top end, like the bottom, a fixed one, too.

Detail 6.—If a stiff continuous plate is used at the cap of the stanchion as shown, it will greatly assist against bending; otherwise the tendency is for the bolts to snap as in Detail 3, due to the great leverage.

Detail 7 illustrates the side racking produced by a crane, and dragging material across the floor of the shop aggravates such a consideration. It is usual when designing for this horizontal force to allow for a side load equal to one-twentieth of the crane weight plus its load, and thus its effect is very considerable indeed. Unfortunately, owing to headroom clearance, oxter stays, where they might have been most effective, generally cannot be used.

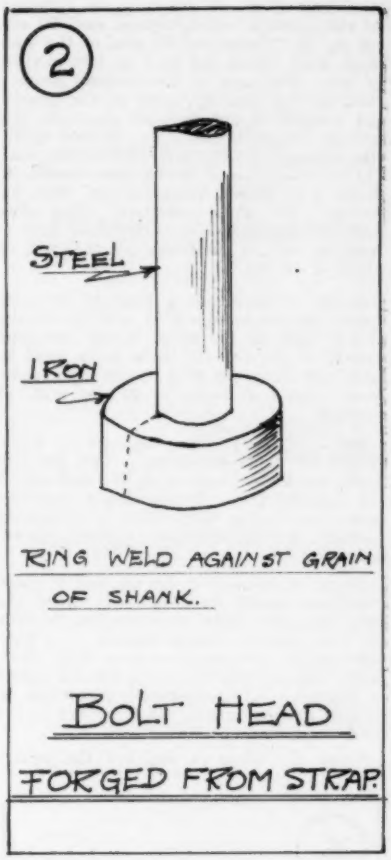
Detail 8 shows how a stanchion base should properly be stiffened if there is an eccentric load above.

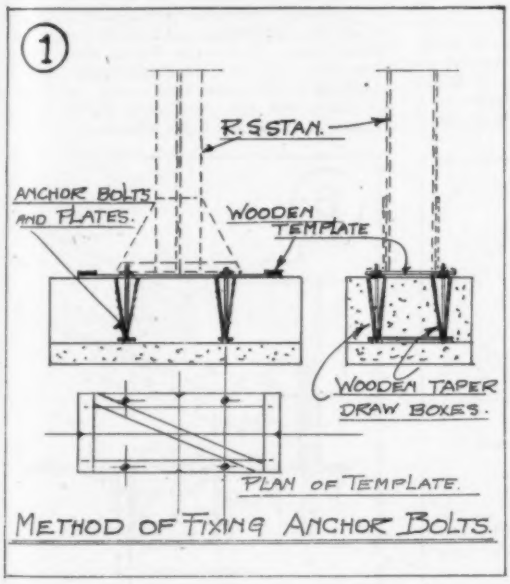
Detail 9.—In the example given it will be noted how great is the effect of eccentric loading. If loaded as shown by a ten-ton eccentric load, then its effect on the stanchion is equal to a concentric load of 47.5 tons.

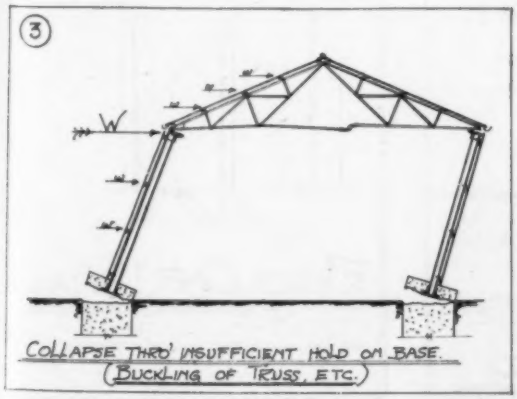
Detail 10 illustrates a bad roof joint. It will be noted that one leaf of the angle tie must needs carry all the load. The alternative connection shown is much to be preferred. As a rule, however, some members of trusses can hardly be made light enough so far as stresses are concerned, and rust and practical sizes for the connections must be considered. In truss design, the principal factors fixing strength are the distance apart of the purlins and the spacing of the trusses. The former fixes the length of the rafter acting as a strut. It is usual to take such struts in roof design as fixed one end only. For practical purposes no gusset plates and no bars in trusses should be thinner than 5/16 in. If, as is not uncommon, ¼ in. material is used, then ⅝ in. rivets have such a low bearing value (1½ ton) that too many would be required, or the point might be overlooked and defective design result. Rivets, ¾ in. dia. and taking 2½ tons in single shear, are much more preferable. It is very important, too, to remember that in many trusses, etc., there are double angles together, back to back, and that it is impossible to paint between them any time after the trusses are made. This shows the necessity of painting well in the first place, and having a little margin in the way of thickness when specifying.

Detail 11.—Note here that the stanchion has its axis turned the wrong way round to resist bending from the cross-racking crane load. Many stanchions are made thus; but it is easily possible to set up vibration by hand on such by shaking from the ground.

Detail 12.—This shows the extra strength obtained by building a R.S. stanchion in a wall in the direction drawn. The actual strength which can be reckoned on is depen-







dent on the conditions and width, etc., of the wall, and some authorities will not permit the wall to be taken into account in the design.

Detail 13.—BASES.—The areas of stanchion bases are, of course, fixed by the safe load on the concrete, which equals, say, 10 tons per sq. ft. Therefore the area of the stanchion base equals the load in tons divided by ten. The area of the concrete block is fixed by the bearing value of the ground, and is equal to the combined stanchion load and the weight of the block, divided by the bearing value of the soil (one to ten tons). The example (traced from a trade handbook) shows a projecting plate for the base, unstiffened, and thus ineffective. The whole stanchion base must be stiffened to have at least as rigid a resistance as the pad on which it stands.

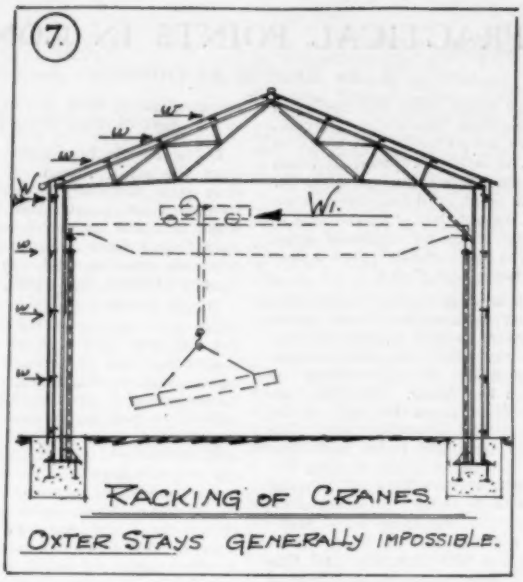
Detail 14 illustrates a form of tie joint known as the lozenge. It will be noticed that to take up the stress in the two cases shown, in the second, three holes must be taken out as against only one in the lozenge, which equals a saving of 25 per cent. of material.

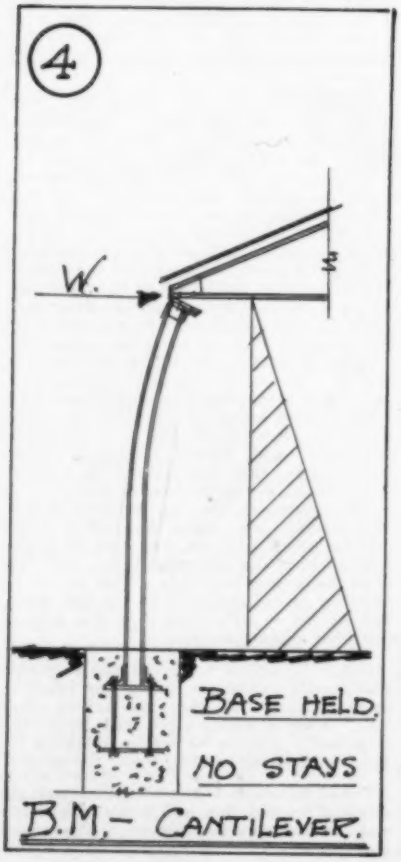
Detail 15 shows a form of strut for roofs, girders, or light stanchions. Two pairs of angles are shown, both being of equal weight and sectional area. By the simple expedient shown, the radius of gyration is practically doubled, and the strength increased accordingly.

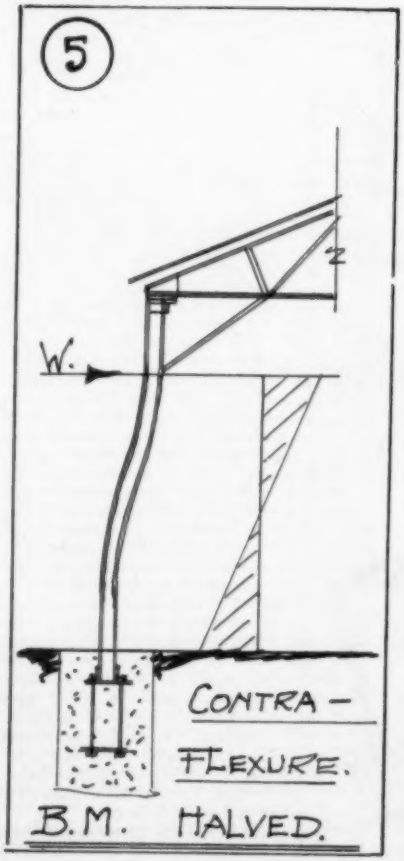
Detail 16 shows how the top end of gable stanchions should be supported—there are many examples where they are left "in the air," as it were. Eaves bracing in a horizontal plane is necessary to meet this. Side, rafter, and end-frame bracing (shown dotted on drawing) is also generally necessary to prevent the overturning tendency due to the wind.

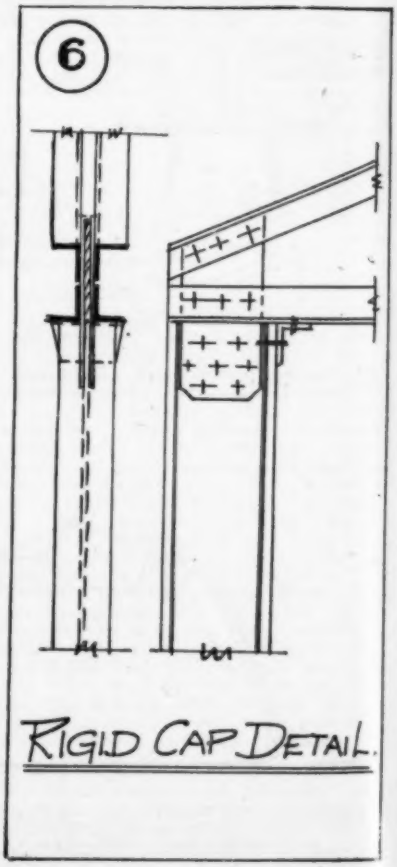
Detail 17.—Here is sketched the underpinning for some shop-front alterations. Now, it is quite customary for the main supports to be carried on a flat timber runner on the footpath. A timber, such as a 3 in. by 9 in., is often used, the 3 in. thickness, of course, vertical. This is of no use for a proper distributor, which must have vertical stiffness, and not less than a 9 in. by 9 in. should be used in such a case. The point is that nobody examines what is under the footpath, and to put heavy concentrated loads upon it is asking for trouble. It might even be that the footpath has been up a short while ago, and that there is no hard ground at all to deal with. A knowledge of the footpath and strong distributors are absolutely necessary.

Detail 18 illustrates alterations for a shop front, where a steel beam has been inserted, jointed over a new column, and the timber floor joists not bolted to the new beam at all. An outwards collapse would be quite expected in the circumstances, and similar things have taken place. It is quite obvious that the old floor joists, or some other substitute, must be attached to the new steel beam to form a tie back, and the steel beam should not be broken at the head of the column.









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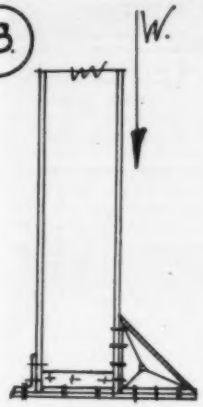
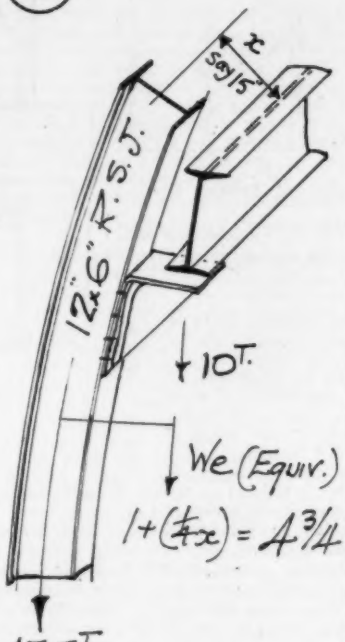


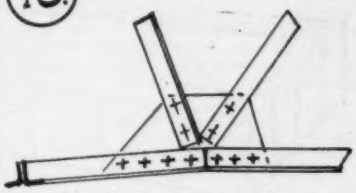
RELIEF OF ECCENTRIC LOADING ON BASE.

9

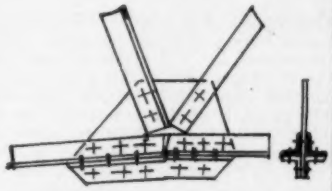


ECCENTRIC LOADING ON STAN.

10.



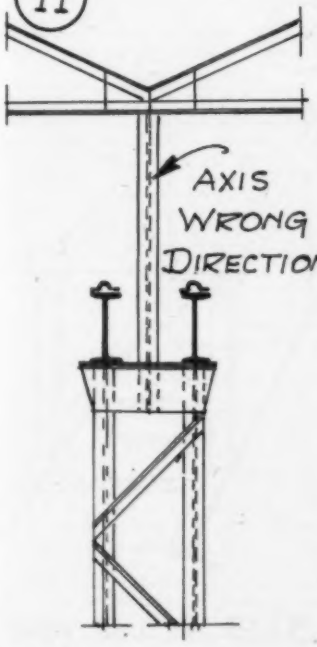
BAD CONNECTION.



GOOD CONNECTION.

ROOF TRUSS DETAIL.

11



CRANE STANCHION.

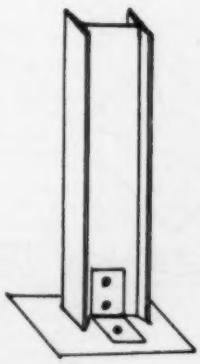
12

STANS. IN WALL.

FOR 10"×5" R.S.J.
R = 4.
r = 1.

∴ 4 TIMES STRENGTH MAY BE TAKEN IF BUILT IN AS SHOWN.

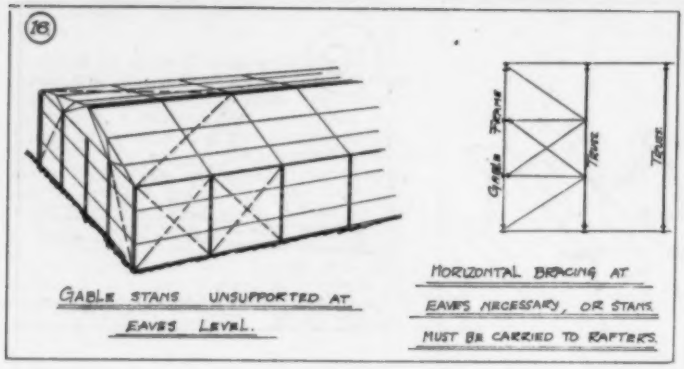
13

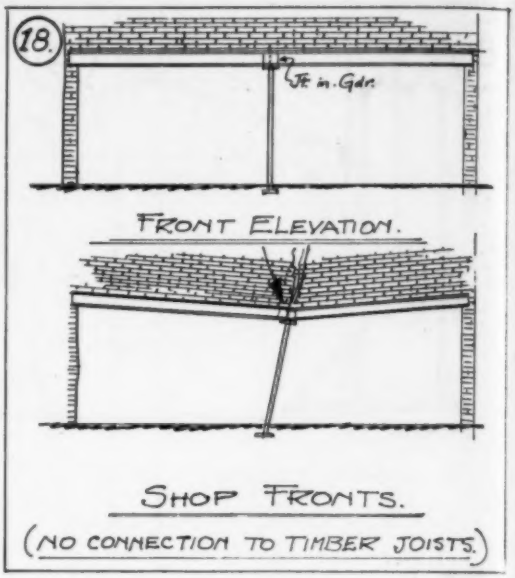


INEFFECTIVE BASE DETAIL.

(FROM SECTION BOOK.)

Diagrams illustrating Practical Points in Construction.



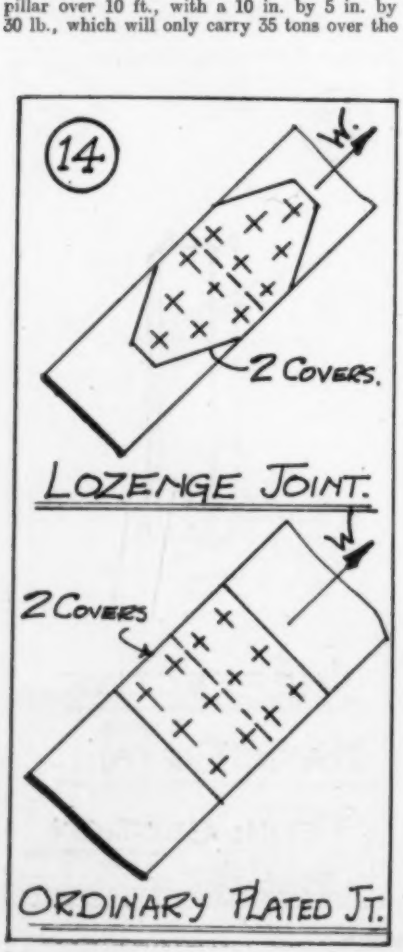


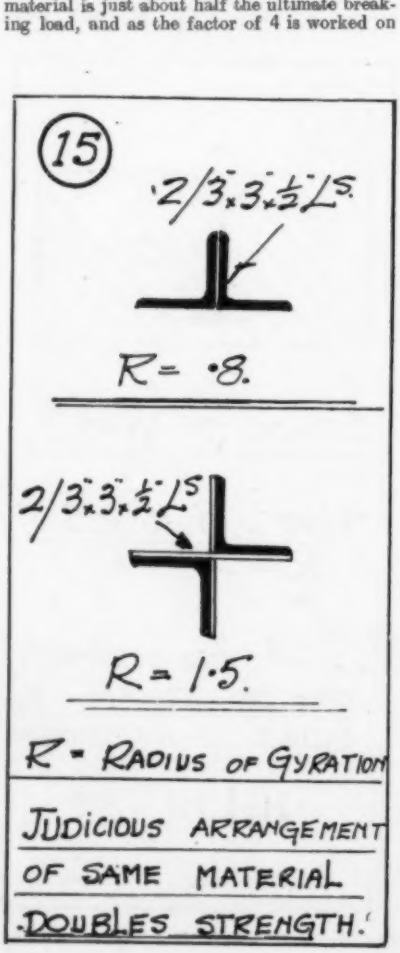
COEFFICIENT OF EXPANSION.—Both steel and concrete have practically the same coefficient of expansion, i.e., 7/1 millionths, and for the range of temperature in this country (of, say, about 150 deg. Fahr.) 1/1,000 part will expand; (thus, in such a structure as the Forth Bridge, with a span of 1,710 ft., there would be an expansion of 1.7 ft.). For the utility of reinforced concrete this coincidence in expansion is what makes it practicable.

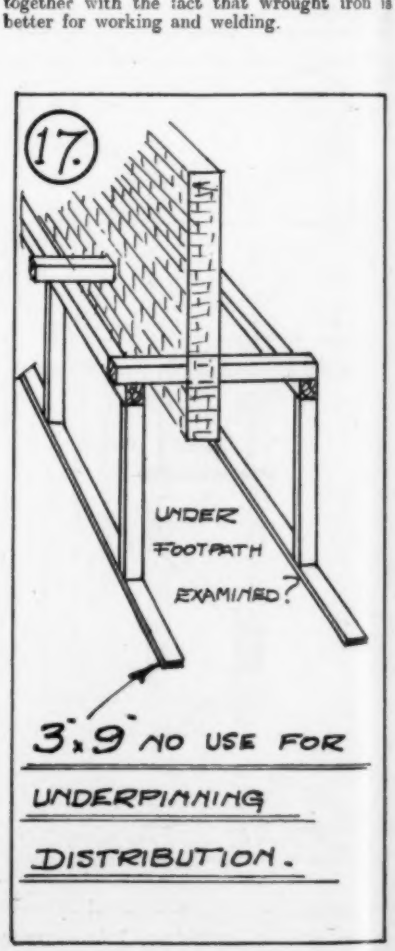
MATERIALS.—With regard to steel sections, it should be noted that the mills charge extras for shape; for very common sections (3 in. by 3 in. angles, etc.); for very uncommon sections; for thickness; for thinness; for length (over 60 ft.); for shortness (under 10 ft.) for special tests; for small lots, etc. It is thus obvious that it needs some special training in order to specify wisely and well.

PILLAR SECTIONS.—Compare 8 in. by 6 in. by 35 lb. R.S.J., which carries 50 tons as a pillar over 10 ft., with a 10 in. by 5 in. by 30 lb., which will only carry 35 tons over the same length. There is thus a bigger capacity for the squarer section, equal to an increase of 25 per cent. It must be stated, however, that in the design of steel buildings there are few examples of pure pillars; the bigger force generally is due to side wind and bending.

FACTOR OF SAFETY.—In structural work it is generally understood that a covering margin of four times the required strength is provided. This is not so. It is more correct to call this just about two, and when allowance is made for bolted work, bad rivets in places, or slightly defective workmanship, then there is very little margin at all. The point is easily explained; the elastic limit of the material is just about half the ultimate breaking load, and as the factor of 4 is worked on the ultimate breaking load, it will be seen that the margin actually comes down to a factor of 2. The effect of corrosion also must not be lost sight of, which has a considerable effect on any margin of safety. It might be here observed that mild steel is much more susceptible to corrosion than wrought iron. This accounts for gates and railings, etc., being almost invariably made in wrought iron, together with the fact that wrought iron is better for working and welding.







PRE-CAST CONCRETE

SIMPLE RULES FOR GOOD RESULTS.

THE manufacture of all types of pre-cast concrete building units, or concrete products, has now largely developed into a specialised industry. For such goods as architectural cast stone, which requires special knowledge and skilled workmanship for the production of a stone with a good surface and wearing properties, and for pipes and such units as need a fairly expensive plant, a really satisfactory product at an economic cost is almost impossible outside a factory that can keep an experienced staff together and with a regular output sufficient to keep the plant fully occupied. Generally, too, all types of concrete products made in a factory are superior to those made by the average builder for his own use. Obviously, this is because of the specialised knowledge of firms who make a business of this class of work, but there is no reason whatever why pre-cast concrete building units equal in quality to the factory-made product should not be manufactured by a builder for his own use, provided one or two simple rules are borne in mind.

First, it is necessary to realise that there is good and bad concrete, just as there are degrees of quality in any other building material. A heap of rubble and cement, mixed together in no definite proportions, will bind together and form a mass of "concrete," but not a concrete of strength and durability. There are a few elementary principles necessary for the production of good concrete, a knowledge of which will enable any builder to produce simple concrete units of the same quality as the factory-made article.

The various stages in the manufacture of concrete may be enumerated as follows: (1) Selection of materials; (2) Proportioning, including water content; (3) Grading; (4) Mixing; (5) Moulding; (6) Curing; and notes are given under each of these headings, which, if carefully followed, will result in a concrete that will fulfil all ordinary requirements. It must be understood that these notes relate to plain concrete only, and are not applicable to cast stone.

Materials.

The coarse material generally used is river or pit ballast or gravel, and there is no better aggregate. If it is cheaper, however, hard broken stone is quite as suitable. Sand may be either from river or pit. The size of coarse aggregate should be between ⅜ in. and 1 in.; the larger the aggregate the stronger the concrete, but for building units the maximum is usually 1 in. owing to the difficulty of placing in moulds if anything exceeding this size is used. For articles with any small detail ⅜ in. or under should be used, as larger material will not run into the shapes in the moulds. Fine aggregate should be from ¼ in. down.

Whatever aggregate is used, it is essential that it should be clean. More poor concrete results from dirty aggregates than from any other cause. If dredged from a river bottom there is generally no need for further washing, but the bulk of pit gravel requires washing before use owing to the presence of loam and impurities of a vegetable nature. A good test is to rub the material between the hands; if it leaves a film of clay or other foreign material on the hands it should be looked upon with suspicion and a further simple test undertaken. This consists of half-filling a glass bottle with the material and adding water until the bottle is nearly full. Shake the bottle vigorously for at least one minute and then allow it to settle for an hour; if the layer of sediment deposited above the sand is found to be equal to one-fourteenth or more of the total depth of the material the aggregate should be washed and tested again until the amount of clay or silt is less than one-fourteenth of the total volume.

Provided the cement complies with the British Standard Specification for Portland cement (all the best English brands far exceed the strength requirements of this specification), and that it is not stale, it will very rarely be found that a poor concrete is due to the cement. Cement is made under close supervision and subjected to frequent tests; concrete is a mixture of several materials passing through many processes under site conditions, so that poor results are far more likely to be due to bad workmanship than to poor cement.

Proportioning.

For the ordinary run of pre-cast concrete the time-honoured proportions of 1 part cement, 2 parts sand, 4 parts coarse material can hardly be improved upon. It is true that with modern cements a leaner mix may be used, and the same strength obtained as with a richer mix with cements of even 10 years ago, but 1:2:4 with the cements on the market to-day allows a margin of safety to cover the small irregularities inseparable from work done, generally by unskilled labour, under job conditions.

Water content of concrete has been the subject of much discussion in the past two or three years, and it has been shown that the less water used the less cement is needed to obtain a given strength, always provided that there is sufficient water present to hydrate the cement, and that it is not allowed to dry out until the concrete has hardened. To apply this discovery to pre-cast work does not need any radical departure from common practice, because a stiff mix is invariably used in order that the moulds may be released early. In fact, the economic necessity for early removal of moulds for re-use has often led to the use of too dry a mix, with the result that weak concrete is produced. To comply with the essentials needed in pre-cast concrete work, namely, a consistency that will flow into the shape of the mould, and at the same time be stiff enough to permit the release of the moulds within a reasonable period, the best concrete is one that can best be described as "plastic"; it should not be wet enough to flow, nor so dry that a shovelful thrown on to a heap will not sink into the mass and lose its shape. It is essential that the fine particles should slip into place between the larger ones, and so form a dense mass, without relying upon mechanical pressure only, and in these notes it is assumed that machines are not employed. The mass must be "lubricated."

Besides having less strength than a concrete that is plastic only, a "sloppy" concrete will slump in the mould during hardening, and necessitate more concrete being added to fill the mould, with the consequent danger of lack of cohesion; it will also result in holes on the surfaces against the faces of the mould, commonly known as "blow holes," due to small pockets of water leaving cavities when they dry out. Too dry a concrete will cause weakness due to insufficient hydration of the cement; it will inevitably be porous; it will frequently contain voids owing to the bridging of coarse aggregate because the mass is not sufficiently wet, or lubricated, to permit the fine aggregate to slip into position and fill the interstices between the coarse; and for the same reason it will generally have a rough face, with many small cavities where the sand has not worked its way between the aggregate against the mould faces. All these troubles, and they are the principal difficulties of the beginner at pre-cast concrete work, may be avoided by the use of the proper consistency and by proper grading.

Grading.

By grading is meant the graduation of the size of the fine and coarse material so that maximum density is obtained. That is, from the largest stones downwards there should be smaller stones that will fill the spaces between the next larger size. Density is the essence of strong concrete, and there can be no density without thorough grading.

A simple test is to half-fill a glass jar with the aggregate, and then cover it with water; the quantity of water that can be poured into it is the amount of voids it contains. Then add finer material until such a grading of fine and coarse material is obtained that will take the least quantity of water to cover it. As stated above, 4 parts of ⅜ to 1 in. material to 2 parts of sand will give a good grading provided the coarse material itself is well graded between the maximum and minimum sizes. If it is not fairly well graded more fine material will be necessary, but it is generally more economical to grade the coarse material than to add to it more than 50 per cent. of its bulk of sand, because the more sand a concrete contains the more cement will be necessary to give a definite strength owing to the increased surface area of aggregate to be covered. It is cheaper to fill voids with finer aggregate than with cement at about £3 a ton.

Moulding.

Concrete may be moulded in receptacles made of any material that can be worked to shape and that is strong enough not to get out of shape due to the weight of the concrete and the pressure of the ramming necessary to consolidate it. Wood is the material that most economically fills these conditions, and is therefore generally used.

The design of moulds is outside the scope of these notes, but one or two general hints may be given. First, the timber must be of such a thickness as to give an ample margin of safety against bulging or twisting out of shape, as this would obviously affect the shape of the unit being made. As a rule 1½ in. or 2 in. well-seasoned deal is most suitable, and is easily worked to shape. When the mould has been made it should be soaked in water for 24 hours to allow it to swell. If this is not done the wood will swell when filled with wet concrete, with disastrous results to the shape of the casting, while swelling resulting from the soaking may be easily put right with ordinary carpenters' tools before the concrete is placed. Moulds must always be oiled before filling to prevent the concrete sticking to the wood; if this is not done it will often be found quite impossible to remove castings without either destroying the mould or damaging the arrises of the concrete. There are on the market special mould oils for this purpose, but paraffin rubbed on with a damp rag is suitable. Every time a mould is used it must be carefully cleaned of any adhering concrete, and oiled again before re-use.

Machine moulding is essential for the mass production of plain blocks and slabs at an economical price to compete with other walling materials, and is the exception referred to where a stiffer mix may be used. The stiff mix is necessary if the units are to be removed from the machine on pallets only, but the pressure exerted by the machine results in effective consolidation with the dryer mix; in hand moulding consolidation is by hand-ramming only, and a plastic mix is necessary if the particles are to slip into place to produce a dense concrete, whereas in pressure machine moulding the materials are forced into a dense compact mass.

When consolidating by hand, the tamper or spader should be worked well against the faces of the mould in order to bring fine material to the surface and eliminate the possibility of cavities between the coarse material. Particularly in large units the concrete should be placed in layers of three or four inches at a time and each layer thoroughly rammed; otherwise cavities are liable to be found in the body of the casting.

Curing.

Concrete does not reach maximum strength until it is at least one year old. At 28 days it has about 60 per cent. of maximum strength. At seven days only about 35 per cent. With this in mind, when it is stated that as soon as concrete dries out it practically ceases to gain in strength, the importance of thorough curing will be realised. This can

readily be tested by placing a test piece in a hot oven as soon as it is moulded; it will never harden, and crumble in the fingers when removed, no matter how long it is left in the oven. In tropical countries concrete has to be submerged in tanks as soon as made if it is to harden. Thus the most important part of curing is to keep the concrete moist for at least a month after it is made, either by sprinkling or other means. It must also be protected from hot sun or drying winds that would dry it out; a covering of old sacking or straw is a useful method. Frost must also be guarded against, as if the water in the material freezes it will increase in bulk, leaving small cavities that will remain in the face of the material after the ice has thawed and dried out, and such a face will readily disintegrate.

By the use of rapid-hardening Portland cement the curing period may be reduced to four days, as at this age rapid-hardening Portland cement concrete is as hard as ordinary Portland cement concrete at 28 days.

COMMUNAL HEATING

SUCCESSFUL INSTALLATIONS IN DENMARK.

FOR many years methods have been considered for making some profitable use of the waste heat of industrial plants. In many cases the waste is too small to be put to any useful purpose outside the plant itself, but in certain instances, such as electricity works, it is very considerable. At present the steam used for driving the turbines at electricity works is not only wasted after it has done its work, but expensive cooling towers have to be erected in which to cool the hot water. Some attempts have been made in this country to utilise the waste heat from electricity works for heating housing schemes, but the idea has not been developed to any considerable extent, principally on account of the great loss of the heat of the steam or hot water during transmission through underground pipes and the inborn prejudice in this country against heating private houses by radiators. On the Continent, however, the supply of heat is making headway, and although it is not yet anywhere available as freely as gas, electricity, or water, it seems to have been proved that heat transmission over considerable distances is a practical proposition.

One of the earliest long-distance heating systems was installed in Copenhagen, by the Municipality, in 1924, comprising an experimental section of about 110 ft., and, after this had been in successful operation for a year, a further section of about 440 ft. The object of the experiment was to test a new insulating material, known as cell concrete, which had been invented in Denmark shortly before and which was claimed to have far better insulating properties than other materials ordinarily used for the purpose. Cell concrete is made of cement, or cement and sand, to which is added a foam which causes the mass to become honeycombed with air cells. Thus it is very light in weight. This material may be precast in blocks, and afterwards cut to the desired external diameter and internal bore for pipe coverings. For long-distance heating systems, however, the cell concrete is placed *in situ* in the street trenches, the pipes being placed as the cell concrete is poured; the insulation thus serves the dual purpose of lining the trenches and insulating the pipes. Although cellular, the material is not porous. The type of cell concrete used for insulating heating pipes has a specific gravity of 0.3, and a co-efficient of thermal conductivity of 0.05.

The 440-ft. section laid in Copenhagen in 1925 carried hot water from the Gothersgade Electricity Station to two office blocks, comprising the offices of the Municipal Tramways, Gas and Electricity Departments. Close observation was kept on the operation of this installation for a year, and a more ambitious project on the same lines was then put in hand, namely, the installation of about 9,500 ft. of heat transmission pipelines from the Eastern Copenhagen Electricity Station to supply heat to a church, a sports pavilion, a pavilion at a tennis ground, a Freemasons' Lodge, a soap factory, two hospitals, and two almshouses. In these buildings the heat transmitted from the electricity works is used for general heating, washing, baths and industrial purposes.

Superheated steam is fed into the pipes at the electricity works at a temperature of about 350 deg. Centigrade and a pressure of 12 atmospheres. When it reaches the buildings supplied the temperature of the steam is approximately 200 deg. Centigrade and the pressure 8 atmospheres. The steam is taken direct from the boilers at the electricity works and condensed by separate plants at each building served. The total amount of heat transmitted in this system is 16,000,000 calories per hour, corresponding to a coal consumption of approximately four tons per hour. This installation was put into operation at the beginning of 1927, and after a year's experience of its operation the municipality decided to develop the system in connection with the Gothersgade Electricity Works, where the first experimental pipeline had been installed.

The total length of the new installation from the Gothersgade Electricity Works has a length of about 3,300 feet, and was commenced in May, 1928, for the purpose of supplying heat to a municipal hospital. It had already been decided to rebuild this hospital, and it was found to be cheaper to transmit heat a distance of over 3,000 feet from the Electricity Station than to install an individual boiler plant at the hospital. The steam is supplied at the same temperature as in the case of the installation fed from the Eastern Electricity Station, and is used for heating, washing, bathing, and general hospital purposes. The amount of heat transmitted is 11,000,000 calories per hour, equivalent to approximately 2.2 tons of coal per hour. In this case also the steam is taken direct from the boilers at the electricity works and condensed at the point of consumption.

The success of these installations in Copenhagen has led to serious consideration of the subject of long-distance heating in Denmark, and when at the town of Aarhus it was decided to erect new electricity works, a new railway terminus, and a series of blocks of flats, the opportunity was taken of designing the electricity works as a combined electricity and heating station, so that the new buildings could be supplied with heat as well as other public services. In this case hot water is actually supplied through the pipes, and not steam, as in the two installations at Copenhagen, thus eliminating the necessity for condenser plants in the buildings supplied. The method is to use the exhaust steam, after it has done its work of driving the turbines, to heat water. So far, a total length of about 4,200 feet of pipes has been laid, supplying hot water to the central railway terminus, the new blocks of flats, business premises, a large hotel, and other buildings, a total of fifteen blocks of buildings.

When it leaves the works the water has a temperature of 100 to 120 degrees Centigrade, and after complete circulation throughout the system it has a temperature up from 60 to 70 degrees Centigrade. The present capacity is 7,000,000 calories per hour, which it is proposed to increase to 15,000,000 calories per hour, corresponding to a consumption of 3½ tons of coal per hour.

It will be gathered that the method of insulation, resulting in low heat losses through considerable lengths of piping, is the primary factor in the success of these installations, as in other respects the method of transmission is the same as has been used with less success in the past. A further factor is that the time required to lay the ducts is reduced. In the more usual methods a trench is dug and lined with concrete, and work held up until the concrete has hardened; also, many insulating materials have to be applied to the pipes when hot while the steam or hot water is flowing through them. With cell concrete, however, the insulating material also acts as the trench lining, and as the pipes can be covered with the cell concrete while cold, the work of pipe laying can proceed without interruption.

We understand that similar long-distance heating installations are contemplated in several other parts of the Continent, where the electricity authorities are watching with considerable interest the development of what promises to be a practical method of utilising waste-heat energy

DRAUGHTS AND CHIMNEYS

Draft and Capacity of Chimneys. By I. G. MINGLE, C.E. New York: D. Van Nostrand Company. 1925. 329 pages.

THE author claims that this book is the first to attempt to fill the need that exists for a complete treatment of the problems that occur in the design of power plants in which fuel has to be burnt efficiently. It is very properly pointed out that with the enormously increased capacity of power plants, the chimney problem has become relatively of much greater importance when preparing plans, the cost of the chimneys forming an important item in the total costs. The author has divided his subject among 19 chapters, one of these being devoted to a general survey of the subject, and in this section there are many passages that prove the author to be one who has had to do with chimneys practically. After defining "draft," and distinguishing between natural and forced draught, the means by which draught is produced is discussed, but the major portion of the book deals with natural draught, because that is always associated with chimneys. The author states that the advantages of natural draught are: (1) Absolute dependability; (2) no maintenance; (3) chimney is everlasting; (4) ordinarily no space required in boiler-room; (5) original low cost.

Surely Nos. 2, 3 are misleading, or the business of chimney jacks would be perilous financially? The design of a chimney essentially consists in the determination of its height, its sectional area, and then the thickness everywhere, to ensure stability. The foundations required depend upon the character of the site upon which it must stand. The capacity of the plant to be operated determines the weight of coal that must be burnt per hour. This indicates the quantity of gases that will be produced, and so leads to the necessary section of flues and chimney. The character of the fuel, length of flue passages, the nature of any obstructions, such as economisers, feed-water heaters, etc., that have to be overcome by the flue gases, lead to an estimate of the draught required, and hence to the height of the chimney-top above the grates. These problems are discussed first by considering the laws of gases in motion, the forces producing such motion, and then by a discussion of the phenomenon of combustion. The character of the products of combustion and their volume is next dealt with, and so the capacity of the chimney required is eventually determined.

As regards actual construction, nothing is said, but possibly the author will include this in the additional volume which he hints is in progress upon this subject. There is much useful matter scattered about that needs bringing within such a book as that before us which would help builders very considerably. The work of maintenance and repairs could be in many instances materially reduced if architects and builders knew better what was required.

MODERN CONSTRUCTION METHODS

MANY important improvements have taken place of late years in both the structural design and the erection of buildings, but it is with the latter aspect of building work together with the special types of plant now in use that we now propose to deal. A short description of a few large contracts now in progress will best explain what changes have come about in constructional methods.

On a site bounded on the west side by Shepherdess-walk, on the north by the Regent's Canal and on the south by Eagle Wharf-road, there is at present under construction a reinforced concrete warehouse for Messrs. Pilkington Bros. This building will be used for the storage and silvering of glass. The superimposed loads on the floors of glass stores are very high, and in this case the reinforced concrete floors have been designed to carry 4½ cwt. per sq. ft. The building consists of a basement, over part of the site, containing the boiler-house, lavatories, pump room and men's messroom and three floors. The basement is in the north-west corner of the site, and, being adjacent to the canal, the walls are of concrete, coated on the inside with Val de Travers asphalt between the concrete and the inner brick wall. The basement floor is, of course, also asphalted. Above the basement the office will be erected at ground-floor level, with an entrance from Shepherdess-walk in Portland stone and with vaulted ceiling. The other entrances include one from Shepherdess-walk and three from Eagle Wharf-road.

In order to keep the foundations free from canal water a row of the British Steel Piling Co.'s steel piling was driven on the north side. These piles penetrate 8 ft. into the bed of the canal and retain a head of 6 ft. of water. The amount of leakage each day is extremely small. The tops of the piles are connected by a timber waling strutted off the top of the wharf wall. The latter has been fitted with timber fenders. Foundations have been taken down to about 18 ft. below ground-floor level, where good hard ballast was met, and the loads are carried by a 1 : 2 : 4 cement concrete wall 6 ft. 6 in. wide and 10 ft. deep. Below each reinforced concrete pilaster this strip footing has been reinforced. In order to provide a dock a large portion of the ground floor has been made up as a dock using a minimum thickness of 3 ft. 6 in. of 12 to 1 mass concrete, the aggregate for this being Thames ballast, and, in some places, broken brick and stone from the demolished houses which originally stood on the site. Over this mass concrete two coats of hot pitch have been spread to receive the 3-in. concrete ground floor, which is reinforced in both directions with ½-in. bars at 12-in. centres. The wearing surface will consist of a wood-block floor 3 in. in thickness. At the dock entrance 2 in. of rock asphalt is to be laid on top of the floor.

The walls above ground level consist of reinforced concrete pilasters filled in with 1½ in. thick red brick, supplied by Messrs. S. and E. Collier, of Reading, on the outside and on the inside faced with Arlesley bricks which will be spray-painted. The glazing, which on the Shepherdess-walk elevation includes windows, 25 ft. by 9 ft. overall with semi-circular tops, is in Crittall's steel sashes. The upper floors of reinforced concrete are finished with granolithic. The floor panels are 26 ft. by 24 ft. 9 in. in area, with beams between the tops of all the columns, and one secondary beam in each panel. The columns are to be octagonal in section, 24 in. across the flats. Each floor is fitted with a sprinkler system, the sub-contractors for which are Messrs. Clarke and Vigilant.

For handling goods from floor to floor two lifts will be installed. Fireproof doors and steel rolling shutters are to be supplied by Messrs. Hayward and Gibson respectively. The stairs are to be in reinforced concrete finished with granolithic. A tower at the south-west corner will carry the tanks supplying the silvering shop with water. The architect for the building is Sir John Simpson, F.R.I.B.A., and the contractors are Messrs. Arnold, of Doncaster. Messrs. Malcolm and Allen are sub-contractors for the electrical installation and Messrs. Helliwell for the metal roof and lantern lights.

In 1911 a reinforced concrete skeleton goods depot was erected for the Great Western Railway Company at South Lambeth, and this building has proved so satisfactory that the railway company is at present erecting another of somewhat similar design alongside it. This new goods depot, for which Messrs. Holliday and Greenwood, Ltd., of London, are the contractors, has many interesting features from a constructional point of view, and the following description should be useful both to railway engineers and all interested in up-to-date methods of reinforced concrete construction.

The new goods depot is approximately 350 ft. by 51 ft. on plan and 60 ft. high from rail-level to parapet. It includes a basement 350 ft. by 56 ft. for storing goods, a ground floor with platforms decked with gurjun—an Indian timber—and fitted with a 6 in. steel nosing, and a space between of 21 ft. 2½ in. for railway trucks. The basement (Figs. 1 and 2) is lighted by steel sashes fixed in the vertical walls supporting the front edges of the platforms. The upper floors, two in number, are designed to carry a load of 3 cwt. per sq. ft. A flat roof, designed for ½ cwt. per sq. ft. superimposed load, covers the top story.

The main reinforced concrete columns are 30 in. by 30 in. in the basement, and have reinforced concrete bases varying from 12 to 14 ft. square. They are at 49 ft. 6 in. centres transversely and 26 ft. 6 in. longitudinally The cross-beam supporting the rail-bearers spans between these columns, and is also supported by a pair of 14 in. square columns, the bases of which are 6 ft. by 3 ft. and about 18 in. below ground-water level. Between each row of two main columns the cross-beams are supported by similar columns at 13 ft. 1½ in. centres longitudinally. The floor under the railway track consists of a 5 in. reinforced concrete slab carried on secondary beams 14 in. by 7 in. in cross-section, the latter being supported by the main cross-beams, which are 18 in. by 9 in. in section and designed to carry 22 ton axle-loads. The height of the basement, the walls and ceiling of which have been lime-whited, is 9 ft. 3 in. under the running roads and 14 ft. under the platforms. The central drain in the basement is fitted with a screw-down valve to prevent floods in the River Thames, which is close to the site, backing up in the main sewer. The 4 in. reinforced concrete walls span between 12 in. by 12 in. counterforts spaced at 13 ft. 3 in. centres. The upper portion of the wall terminates in a coping beam, 16 in. by 14 in., which carries the ends of the transverse beams under the platforms.

Between ground floor and first floor the main columns are 30 in. by 30 in. and carry haunches supporting the crane girders. The main-beams are 47 ft. span, and when the warehouse is loaded carry a very heavy load. The clearance between rail-level and the underside of the girder is 29 ft. 6 in. in the middle of the span. Each girder is 7 ft. deep from floor level to its underside in the middle of the span. The depth at the ends increases to 8 ft. 9 in. The width of the rib is 2 ft. The outer end of the main girder on one side is cantilevered to take the loads from the verandah covering.

The columns are reduced to 12 in. by 12 in. at first-floor level and to 9 in. by 9 in. at second floor. Under the main beams of these floors two rows of intermediate columns have been put in to shorten the span of the girder. The additional columns of the first floor transfer heavy concentrated loads to the main beams under it. All columns are protected at the corners by 3 in. by 3 in. angle-irons fixed to the concrete. The approach end of the building has been designed with a screen of corrugated asbestos sheeting fastened to the concrete work by rag-bolts.

During the erection of this building many difficulties have been overcome by Messrs. Holliday and Greenwood, Ltd., the contractors, and up-to-date methods have been employed in the construction of the formwork. In the early stages of the contract it was found that owing to the footings of the reinforced concrete columns and the basement wall toe being at a much greater depth than the foundations of the existing steel stanchions alongside the existing siding, it was necessary to underpin these foundations, and also to support the existing railway siding which runs parallel to the face of the 5 in. retaining walls and at a distance of only 7 ft. from it. This siding was in continuous use both day and night for heavy goods traffic.

The steel forms for walls and sides of beams used on this job were specially designed by the contractors, and are illustrated in Fig. 3. The repetition of a large number of very heavy beams of the same dimensions called for a different type of formwork from the usual timber construction. Some of the essential points were easy erection and stripping, rigidity, simple adjustment to line and level, and the use of easily transported scaffolding. For the upper stories, where no heavy girders

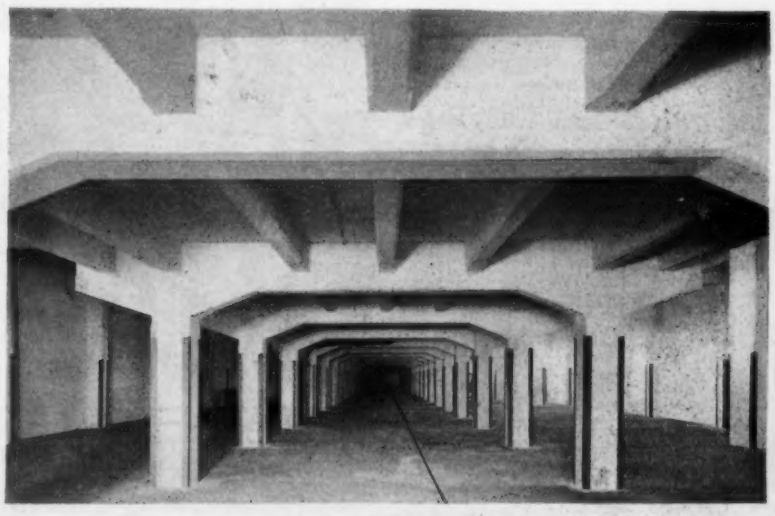


Fig. 1—New Goods Depot in Reinforced Concrete, for the Great Western Railway, South Lambeth: View along Centre Line of Basement.

were necessary, and for the slab and secondary beams between the main girders, timber forms were used. Tubular steel scaffolding (Fig. 4) supplied by Scaffolding (Great Britain), Ltd., was used exclusively. For concreting, two hoists, supplied by A.E.C. Machinery, Ltd., were employed.

One of the most important reinforced concrete contracts in progress at the moment in London is the new warehouse which is being erected by Messrs. Holland and Hannen and Cubitts, Ltd., for Oxo, Ltd., at the site of the old G.P.O. power station close to Blackfriars Bridge. In connection with this it is worthy of note that the very short construction times mentioned in descriptions of works of this nature in the United States are generally obtained by continuous working with day and night shifts throughout a seven-day week. This is a point worth remembering, since in this country a 48-hour week is common, and a fair comparison can only be made when the length of the working day and number of days worked each week are stated.

The site of the new warehouse has an area of about 2,900 sq. yds. On the river front, ground-floor level is only a short distance above the level of the River Thames at high-water, so that it was necessary to construct the front wall of the basement as a reinforced concrete retaining wall resisting water pressure. The existing river-wall did not reach down to ballast but rested on mud, so that it had to be underpinned. This work and the underpinning of neighbouring structures were also constructed in reinforced concrete.

The warehouse consists of a basement floor, ground floor, and seven upper floors. The heights from floor level to floor level are 9 ft. 6 in. in the basement, 9 ft. 3 in. at the ground and first floors, 12 ft. at the second floor, and 9 ft. 6 in. for the remaining upper floors. Each floor is of the "Truscon" type, and is designed to carry a superimposed load of 2½ cwt. per sq. ft. The foundation level is at 21 ft. below ground level, and the whole structure will be carried on 140 square reinforced concrete columns decreasing in size from 29 in. by 29 in. in the basement to 10 in. by 10 in. at the uppermost floor. The lower portions of the columns are reinforced by 2 in. bars. The footings are of the square reinforced concrete type.

A loading dock has been provided on the side next Upper Ground-street, and a loading platform and wall cranes are installed along the river wall. Access to the building from the loading dock is through sliding doors. Three lifts have been provided. The internal walls are of 8 in. of reinforced concrete, and are fitted with iron doors for protection in case of fire. The design also includes a complete sprinkler system. The portion of the brick wall of the old power station which fronts to the river will be retained in the new structure, and the rest of this frontage will be faced with brickwork to match the existing structure. The extremely cramped nature of the site and the small available storage space made the question of plant lay-out an important one for the contractors. The aggregate for the concrete was brought alongside the river wall in barges and unloaded by a travelling Priestman grab. As soon as the grab was filled it travelled along the river wall until it arrived at a point directly over a timber hopper, supported on a trestle on the quay wall, into which it is discharged.

Fig. 5 shows the grab in position for discharging into this hopper, which feeds a petrol-driven belt conveyor with fixed and loose pulley drive transporting the aggregate and sand to a sheet-metal discharge hopper erected on top of the storage bins. This metal hopper is arranged to discharge into either the sand or aggregate bin as required by altering the position of the lever shown at the extreme left-hand side of Fig. 5, and under the control of the driver of the petrol engine which operates the conveyor belt. From the storage bins the aggregates are discharged through steel "batchers," or proportioning devices, which result in great economy in handling the materials, one man only being required to operate the plant and the mixer. The architect for this contract is Mr. Albert W. Moore, F.R.I.B.A., with whom the Trussed Concrete Steel Co., Ltd., collaborated in the design of the reinforced concrete work.

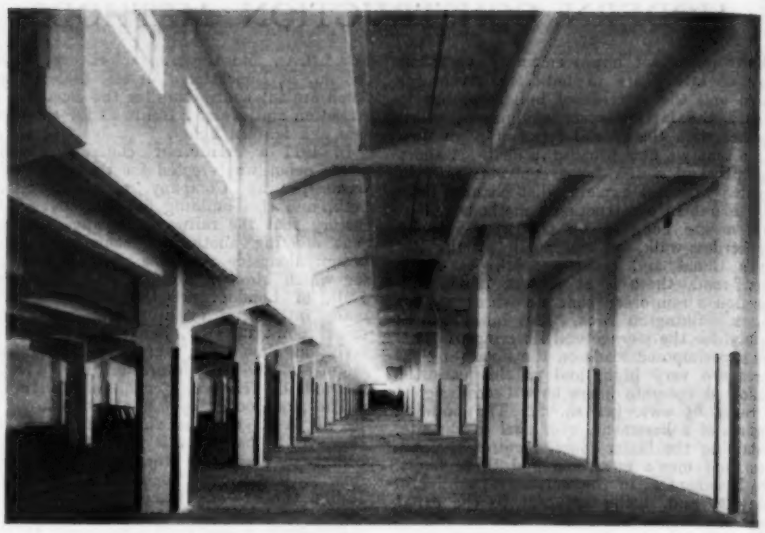


Fig. 2—Side of Basement, under platform.

The application of a dense mortar coating to walls, etc., by means of compressed air is becoming more general in these days. At Bush House the heating panels in which the pipes are buried have been coated with mortar in this way by the Cement Gun Co. Another application of this process has been to the river wall at the new Vintners' Hall.

In floor construction in steel-framed buildings the floor panels are usually of reinforced concrete and the joists are encased in concrete where fire-resisting properties are sought; however, in the new Underground offices and in other buildings a type of reinforced concrete floor is now employed in which the dead weight is reduced by the insertion of metal or tile fillers between the reinforced concrete ribs. In structural steelwork the cast-steel column with square top is coming into prominence in this country as a useful unit where the loads are heavy and space is valuable. Examples of these are to be seen at the Underground offices and in some of the new buildings in the Strand.

The welding of structural steel has made rapid progress in the United States, where experiments have been carried out to discover the behaviour of the weld and the material close to it under impact and secondary stresses. In an American workshop building, 340 ft. long by 135 ft. wide, the 83 ft. span roof trusses and the 34 ft. high columns were all welded by an automatic welding machine through which the material can be fed at whatever speed the operator requires. Adjustable rollers, capable of taking work of various sizes, hold the members in position while they are being welded by the arc process.

Another use for the oxy-acetylene flame is to be found in cutting away old steel or iron bridgework where a new bridge is under construction as, for instance, at the site of the new Cobden Bridge over the River Itchen, at Southampton, where the existing lattice girders were dismantled in this manner before the concrete of the new arch was poured up to the crown.

Fig. 3—Steel Trestles supporting Steel Forms for Main Beams.

In order to reduce the dead weight of steelwork in a building a new type of joist known as the Junior Beam has been put on the market in the United States. These beams weigh about one-third as much as the ordinary standard joists and tests have shown that the reduction in thickness of the webs does not appreciably alter the strength of the beams so far as lateral bucking is concerned.

For the erection of structural steel buildings suspended scaffolding is a useful form of plant which many contractors have adopted lately. The rectangular platform is made of short scaffold boards supported by steel bearers and is fitted with a winding drum at each corner enabling the whole structure to be raised or lowered quickly. The upper supports are steel I-beams, or outriggers.

Improvements in concrete mixers continue to appear and we note that a well-known firm have fitted their mixers with an adjustable baffle plate in the loading hopper. By this means it is possible to dsipense with gauging boxes and at the same time be certain that the proper proportions of materials will be used in each batch.

An instance of the novel uses to which inventions have been sucessfully applied is to be found in the application of the caterpillar track by Scaffolding (Great Britain), Ltd., to the ordinary builder's barrow. These barrows may be easily wheeled up and down steps or over surfaces such as coal heaps or very soft ground.

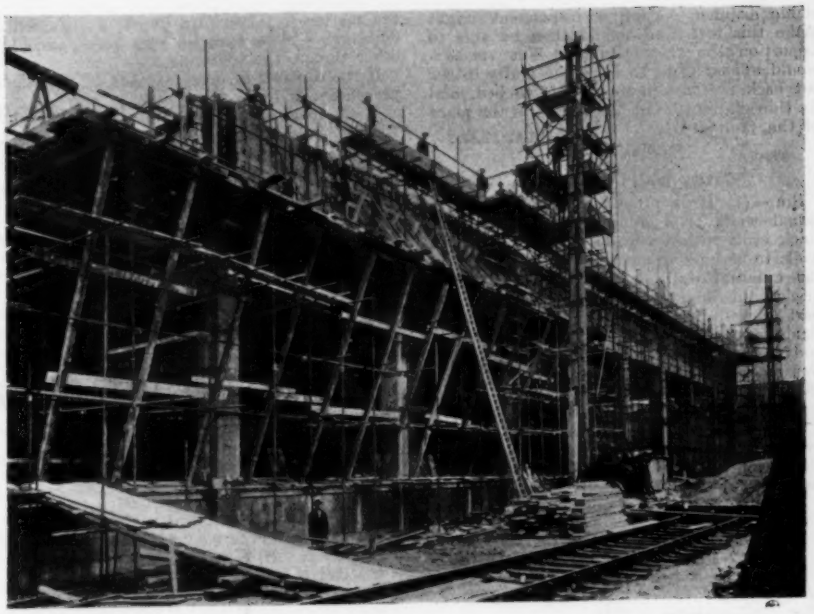


Fig. 4—Side View of Building, showing hoist for concrete

ARCHITECTS' & BUILDERS' INQUIRY BUREAU

We are glad to give questions and answers, but cannot accept responsibility for contributed replies, especially on legal matters.

May we appeal to our correspondents to submit their queries on paper of a size easily filed, and written as legibly as possible, or, better still, in typewriting!—ED.

Mortgage Repayment.

[REPLY TO "STUDENT," JANUARY 4.]

SIR,—Your correspondent will find this quite easy to work out for himself. He has only to know the rate of interest and the amount of the periodical payments required to arrive at the term of years by which the principal shall have been repaid. Working down, period by period, he has to deduct from the weekly payment the interest on the amount owing at the time, the balance being the amount of principal paid off during that period, and to be deducted from the amount owing in calculating the interest for the next period. Each period will involve a decreasing payment in interest and an increasing payment of principal.

FIGURES.

Glazed Bricks.

[REPLIES TO "GLAZE," JANUARY 4.]

SIR,—The brown glazed bricks from which the glaze is flaking off are presumably of the enamelled type, as I have never known salt-glazed bricks to spall. In these the glaze is fused directly on to the substance of the bricks, but in enamelled bricks a "slip" of fine clay is applied to the surface of the "biscuit," and the glaze is applied over this "slip." It sometimes happens that, through some defect of firing, the glaze can easily be flaked off. The bricklayer discovers this when cutting bricks to form broken bond, and it may be the root of this trouble.

The white, powdery scum which shows upon the surface of the white cement pointing is presumably efflorescence, and if the soluble salts of which this efflorescence is composed are carried by moisture into the porous biscuit immediately behind the glaze, their crystallisation in the pores will result in expansion that might force off the glaze, if it were not thoroughly fused on to the bricks.

It is not difficult to understand why this trouble is most pronounced at the vertical edges of the bricks. The cross joints in brickwork are rarely flushed up solid, particularly in glazed brickwork. The bricklayer thinly "butters" the front edge of the brick to form the cross joint, because a thick mortar joint would prevent his getting it tight up to the end of the brick previously laid. So fine is this cross joint that when the course is subsequently flushed up, little or no mortar gets into it. The moisture of construction would seek the path of least resistance for its evaporation. The surfaces of the bricks are glazed and impervious, and evaporation can only take place through the joints. The bed joints are solidly bedded, therefore the bulk of the moisture will probably pass out of the hollow cross joints. The moisture carries with it the soluble salts picked up in its passage to the surface, which are then deposited on either side of each cross joint, thus creating conditions which might have the effect that is complained of.

This is a case which might, with very great advantage, be referred to the Building Research Station at Watford, which exists for the purpose of collecting data upon these problems which occur in the routine of building work.

The access of any moisture to the porous biscuit behind the glazed surfaces of bricks and tiles is frequently a source of disfigurement, if not of actual disruption. The moisture often carries with it dirt in solution, which is deposited behind the glaze, and so forms stains that are irremovable.

L. E. WALKER.

SIR,—The symptoms are those of a damp wall, but your correspondent's description of the construction rather puts this solution out of court. I can only assume, therefore, that the brown glazed bricks were a bad batch in which the glaze was imperfectly incorporated with the clay. A good test is to break a corner of the glaze and put a blot of ink on the broken edge. In a bad brick the ink will be seen to suck under the glaze for an appre-

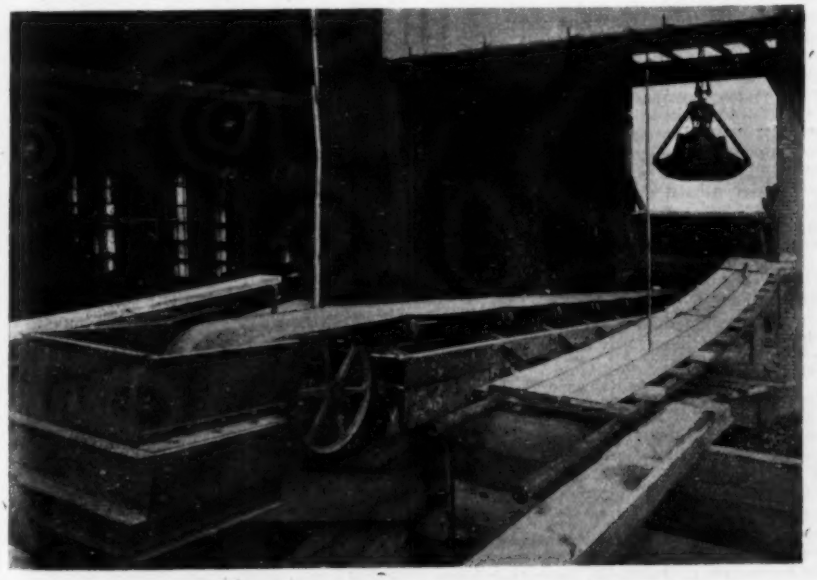


Fig. 5—Belt Conveyor, filling aggregate Bins.

ciable distance. Your correspondent might make this test, and should then be able to apportion the responsibility. The remedy would appear to be to have the faulty bricks cut back far enough to be able to bed, and fix thin glazed tiles of brick sizes in the place of the faulty surface. WHAT ELSE?

Cavity Wall Construction.

SIR,—(1) It is proposed to build the external walls of a bungalow of two 4½ in. thick walls with a 2 in. cavity between, both walls to be built in cement and sand (1 to 3), the external wall of hand-made red facing bricks, the internal wall plastered with one part Sirapite to 2½ parts of sand, with a small proportion of lime putty for first coat and neat Sirapite for finishing coat. Would this make a good job? Is there likely to be efflorescence on the face of the red bricks, or condensation on the face of the plastering?

(2) What distance apart should air bricks to cavity be placed? Are air bricks necessary at top of cavity walls if cavity is open to roof? DOUBTFUL.

Weight of Materials.

[REPLY TO "READER," JANUARY 4.]

SIR,—Here is the data required :—

London stocks...	... 3	ton per thousand.
Blue Staffordshires	... 4½	" " "
Glazed bricks ...	... 3¼	" " "
Plain roofing tiles	... 1	" " "
Pan tiles ...	... 2·7 cwt.	" "

Cement, eight to ten bags to the ton.
Fir, about 66 ft. cube to the ton.
Oak, about 37-40 ft. cube to the ton.
Mahogany, about 50 ft. cube to the ton.

AVOIRDUPOIS.

SIR,—The information required may be ascertained, with a little calculation, from Laxton's & Lockwood's Builders' Price Book, 1928.

The data will be found as follows :—
Bricks—pages 68-70.
Tiles—pages 56, 151-154.
Timbers—pages 158-159.
Cement—page 20.

READER.

Condensation on Plastered Walls.

[REPLY TO "REXOR," JANUARY 4.]

SIR,—The mixing of plaster by hand can never ensure a perfectly uniform consistency, and it is quite possible that parts of the surface deliver up free alkali faster than others. Newly plastered walls that have been distempered always dry out in blotches, which merely shows that this is the case. Another possible cause might be the use of sand not quite free from salt, as may occur in seaside districts where the sand has been drawn from pits under the influence of the salt atmosphere. PLASTER.

Thickness of Walls.

[REPLY TO "SUBSIDY," DECEMBER 14.]

SIR,—I think there can be no doubt (although your correspondent "Wall" seems to think otherwise) that a good thick coat of roughcast in cement is of equal nature to the concrete block upon which it is laid, and should therefore be reckoned in with the net thickness of the wall. A cavity wall of two 4 in. blocks with an inch of cement roughcast should therefore rank as a 9 in. wall for by-law purposes. CEMENT.

Architects' Fees.

[REPLY TO "NIKKO," DECEMBER 21.]

SIR,—The Royal Institute of British Architects, 9, Conduit-street, W.1, has prepared a scale of professional charges (price threepence) which is in no way binding on an employer, unless specifically agreed by him. The scale has, however, been held to be reasonable; and, in any case, an architect is entitled to recover a reasonable remuneration—which, if the matter is taken into Court, a jury will determine. The scale of fees gives, among other things, the following :—

If the contract or order exceeds £2,000, the percentage is to be 6 per cent.

If the contract or order does not exceed £2,000 the percentage is to be 10 per cent., in the case of works costing £100, graduated to 6 per cent. when costing £2,000, as the special character of such works may render appropriate.

As to when an architect is entitled to receive fees, depends on his contract with the employer. There is no doubt, if no mention is made in the contract of the manner of payment, the architect is entitled to payment for the actual work done, by instalments, as the work proceeds. Similarly, if he is to be paid by instalments under contract, he is entitled to sue for payment as and when they become due. But if he is to supervise an entire contract, when payment is to be made by way of commission on the total cost, he may not be able to enforce any remuneration until the whole work is completed; unless there is a breach of the contract on the part of the employer, or some such happening as is suggested by "Nikko," when he would then be able to recover a reasonable remuneration, which, under the R.I.B.A. scale above mentioned, is one-fourth or two-thirds the above percentages, according to the work done (see the scale of charges above referred to).

FEES.

"THE BUILDER" DEBATE

XIV.—SMALL HOUSES, DETACHED OR SEMI-DETACHED?

SIR,—A good many of us find details in the social order which do not individually appeal to us, but if we were all permitted to tinker with the social order until we were entirely satisfied with it, life would be for ever in the repair shop. If I may say so, "Positive" is a social tinker, and not the social reformer he imagines himself.

The question we are discussing reaches deeper than the æsthetics of a cube, as an architectural unit. There is a large class of people who have acquired the habit of life that fits the small house with land all round it and who cannot afford to maintain more than a certain amount of land in decent cultivation—an amount which a combination of circumstances has determined to be of a more or less standard width of frontage. There is no reason on earth why they should take up more land than this, unless it is for the purpose of permitting "Positive" to design an æsthetically satisfying length of ridge to their houses. There is equally no reason why they should deny themselves the width of garden they want, unless it is for the purpose of allowing "Positive" to crowd them up together into Victorian dignity.

There is more in the detached idea even than this. It is not a matter of seeking a draughty enclosure to one's house, nor does hygiene demand it. But hygiene does demand that as many units of the house as possible should have direct access to light and air as possible. And further, economical planning does demand that to achieve this ideal there should be a maximum of outside wall consistent with an economic disposal of the same. If "Positive" has planned many houses, he will know perfectly well how complicated is the problem of disposing the rooms when there are only two walls in which windows may be placed. If he has not, he has only to look in any "terrace" house he likes to find some dark corner or some ill-lighted room. Generally the chief rooms have to be put end on to the windows to give sufficient depth to fit in the various units of the house, and more often than not there has to be a long, insufficiently lighted passage to reach the kitchen quarters, which occupy a valuable part of the garden front for the want of a side wall to light from. These are problems which "Positive" appears to have overlooked altogether, in common with most who have a specific remedy for everything that is not to their taste.

"Positive" speaks rather scornfully of the desire for privacy, which the occupiers of such estates as we are discussing appear to seek. I think he does such occupiers scant justice. The desire to live on one's own bit of land, and to be able to walk round one's own house, is not snobbery but the beginnings of mature citizenship. It is the same desire that has turned the time-server into the man with a stake in the country. Do not let us kill it by ridicule, but rather foster it for the great influences it stands for. And in less lofty tone, there is some reason in the man who prefers to be out of earshot of his neighbour's sitting-room, and who prefers not to be committed to his neighbour's taste or lack of taste in music. If "Positive" contends that a 9-in. party wall is as good an insulator of sound as 10 ft. of open air and two outside walls, I shall have to give him up; but if he recognises this point he must surely see that the desire for detachment, however limited, is not just the idiosyncracy of a snob, but a reasonable demand of reasonable men. The fact that some inefficient planners of semi-detached houses put the rooms on the wrong side is neither here nor there. Such blunderers have had only one thing in mind—the saving in cost of building eight flues together instead of in two separate stacks.

"Positive's" remedy for ugly housing estates asks nothing but sacrifice from the occupiers. They are to put up with neighbouring noises; to be satisfied with an awkward house plan; and dispense with a width of garden which they can well do with. And when the father of the house prepares to take the family for a spin in the car, he is to make a pilgrimage to the bottom of his garden and drive out of a back street to his own street, instead of comfortably loading up together in the garage. Finally, he must be prepared to have the comfortable view of his garden spoiled by a display of the charlady's washing. I do not think much of it.

For my own part, I think we must, as architects, accept what society has found to be its needs, and exercise our talents to express it in decent and comely fashion. If the builders of the past had troubled their heads whether the cube was a true architectural form or not, we might have lost a good many charming old buildings which we are striving to preserve to-day. The cube has simply to be treated with taste to be in itself satisfying, while a number of such properly designed cubes have only to be arranged in decent and variable order to make a satisfying estate of small houses.

The only ground I find it possible to share with "Positive" is the dissatisfaction he feels with the average estate of small houses. But I think he has quite missed the root cause of their imperfections. Such estates are usually designed by the incompetent, whose efforts are foredoomed to failure. We shall not gain the confidence of the public by telling them they are living all wrong, but rather by telling them that they can have what they want in a much better way than they are getting it at present; and I am sure that such imperfect theorising as "Positive" offers us is playing into the hands of those who think of architects as dreamers, apart from the world of reality, whereas they have to be the most complete realists of all.

I have, therefore, to vote against the suggestion that estates of small houses should be laid out in terrace form.

NEGATIVE.

THE DESIGN OF BEAMS AND GIRDERS

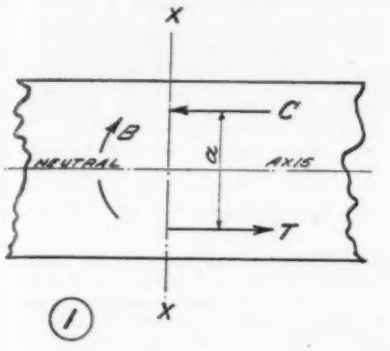
AN ELEMENTARY EXPLANATION OF THE APPLICATION OF THEORY TO PRACTICAL DESIGN

BY EWART S. ANDREWS, B.Sc., M.Inst.C.E., M.I.Struct.E.

STRESSES IN BEAMS; SECTION MODULUS

IT is a well-known fact that in order to investigate the stresses in a beam at any point we must know the bending moment at that point, and also a quantity called the section modulus of the beam.

Referring to Fig. 1 (1) at any cross section XX of a beam the external forces cause a moment B, which we have called the bending moment; the stresses in the beam are all in tension below a line called the neutral axis



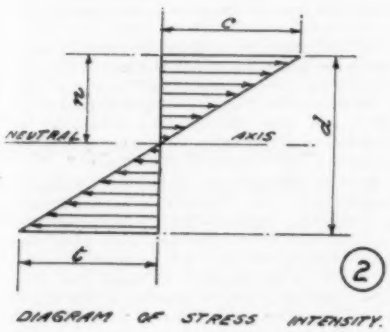


DIAGRAM OF STRESS INTENSITY.

FIG. 1.

(commonly designated $N.A.$) and have a resultant T, and the stresses are all in compression above the $N.A.$ and produce a resultant compression C. In pure bending the resultant tension and compression are numerically equal, and thus form equal and opposite parallel forces acting at a distance a apart, which is called the "lever arm."

The word "couple" is used in mechanics to indicate equal and opposite parallel forces, and so the stresses in the beam produce a couple which is often called the Resisting Couple; this resisting couple has a moment equal to $T.a$, $C.a$ (since $T=C$), and this moment is called the Moment of Resistance, and must for equilibrium neutralise the Bending Moment. Therefore, we see that Bending Moment and Moment of Resistance must be numerically equal and partake of the nature of action and reaction. The moment of resistance of a beam may thus be defined as the bending moment that it is capable of resisting.

Now, according to the theory of bending, which has been proved to be true for materials within their elastic limit, the intensity of stress is assumed to vary as the distance from the $N.A.$, as depicted graphically in Fig. 1 (2), and it has been shown that the following relation holds:—

$$c = \text{maximum compression stress} = \frac{Bn}{I} \qquad (1)$$

$$t = \text{maximum tension stress} = \frac{B(d-n)}{I} \qquad (2)$$

where B = Bending moment,

I = a geometrical property of the beam section called its *moment of inertia*.

Now, in the above expressions, B depends—as we have previously explained—only on the span, the loads on the beam and the method in which the ends of the beam are supported. The shape and size of the beam do not affect it; on the other hand, n $(d-n)$ and I depend only on the shape and size of the beam. It has been found convenient to call the quantity $I \div n$ the compression modulus (Mc) of the section, and the quantity $I \div (d-n)$ the tension modulus (M_t) of the section.

$$\therefore \frac{B}{M} = \frac{B}{I \div n} = \frac{Bn}{I}$$

$$\text{and } \frac{B}{M_t} = \frac{B(d-n)}{I}$$

our formulæ, therefore, become

$$c = \frac{B}{M} \qquad (3) \qquad t = \frac{B}{M_t} \qquad (4)$$

We will remind our readers that there is no magic in formulæ; laws of science are put into the form of a mathematical formula because this is a time-saving procedure—it is, in fact, a kind of scientific shorthand. Mathematicians regard formulæ as more than this, and they can think in formulæ, but to a great number of people who have chosen construction as their calling, this facility is denied; in much the same way a musician can "see" the music depicted in a printed piece of music, but the ordinary person has to play it over before the notation is converted to sounds to him.

As we are writing for the many and not for the chosen few, we will assume that formulæ only express—in a convenient way—rules or laws of structural mechanics.

Formula (3), being interpreted, means:—

"The maximum compressed stress in a beam (tons per square inch), at any given point along its length is obtained by dividing the bending moment (inch-tons) at that point by the tension modulus (inch units) of the section"; and formula (4) similarly means:—

"The maximum tension stress in a beam (tons per square inch) at any given point along its length is obtained by dividing the bending moment (inch-tons) at that point by the tension modulus (inch-units) of the section."

The variation in the intensity of the stress (stress per unit of area) is indicated in Fig. 1 (2), and this does not depend upon the shape of the section; for any given shape, such as the common I section, we can represent the distribution of the stresses by means of the perspective diagram shown in Fig. 2 (1).

This imaginary diagram shows the compression and tension stresses as wedge-shaped solids, and the volumes of these two solid portions above and below the $N.A.$ represent the resultant compression and tensile forces C and T, and in any given section these volumes *must* be equal.

The volume of any portion of these solids in relation to the whole volume gives a pictorial representation of the portion of the total stress carried by that portion, and it is clear from the diagram that the flanges offer much more resistance to bending than the web.

In approximate calculations for deep I beams with thin webs, the web is often neglected altogether, and the stress is assumed to be constant over each flange. In this case we should have, referring to Fig. 2 (2):—

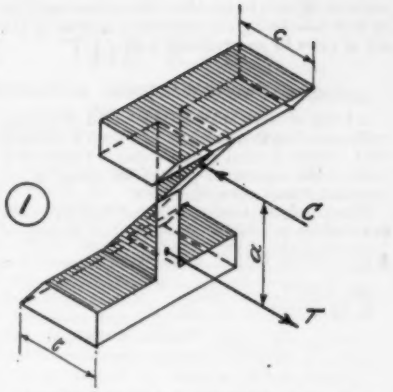


DIAGRAM OF STRESS INTENSITY

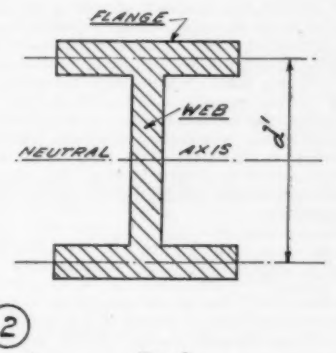


FIG. 2.

Total Tension $T = t \times$ area of flange lever arm; a = distance between centre of flanges.

$\therefore$ Since $T \times a$ = Bending Moment (B), we have

Stress in flange × area of flange × distance between centre of flanges = Bending Moment; *or*—

$$\text{Stress in flange} = \frac{\text{Bending Moment}}{\text{area of flange} \times \text{distance between centres of flanges}} = \frac{B}{A.a}$$

Determination of Section Moduli.

In steel and timber construction the sections are nearly always such that the neutral axis is at the mid-depth, so that the quantities n and $(d-n)$ are equal; this means that the tension and compression moduli of the section are equal to each other. In such cases, we do not require to distinguish between the two moduli and refer merely to the "Modulus of the Section."

In a rectangular section (breadth b and depth d), such as is almost invariably used for timber construction, the section modulus has been shown to be $\frac{1}{6}\,bd^2$. For steel construction we use certain standard shapes and sizes that have been adopted by the British Engineering Standards Association (B.E.S.A.), and the moduli of these sections have been carefully calculated and are printed in the tabulated lists of these sections which will be found in the various text-books and manufacturers' handbooks and catalogues.

Other sections are built up with these standard sections riveted to plates and their section moduli are calculated in a manner which we shall explain later.

Section moduli are of the order of cubic inches, although volume and section modulus are not the same thing; the section modulus may be regarded as the area of the section multiplied by a certain length which we may call the "unit section modulus."

In cases of sections made up of the simple

sections we have to calculate the section modulus by first calculating the moment of inertia by the aid of rules to be explained later.

Numerical Example.

A beam of 15 ft. span carries a load of 12 tons uniformly distributed along it. Find a suitable steel I-beam section (often called a rolled steel joist) if the maximum permissible stress in the steel is 7·5 tons per square inch.

To solve this question we must first calculate the maximum bending moment; the formula is

$$B = \frac{Wl}{8} = \frac{12 \times 15 \times 12}{8} = 270 \text{ in.-tons.}$$

We then use the rule:—

Section modulus required—

$$= \frac{\text{Maximum bending moment}}{\text{Maximum permissible stress}}$$

$$= \frac{270 \text{ in.-tons}}{7{\cdot}5 \text{ tons-in.}^2}$$

$$= 36{\cdot}0 \text{ in.}^3$$

In this connection we will explain what are called dimensional equations, which are of great value in practical calculations in preventing us from making the mistakes of mixing up our dimensions in formulæ. Some students have difficulty when using formulæ of remembering to bring their figures to the correct dimensions; for instance, they usually forget to multiply their bending moments by 12 to bring them to inch units, and for some reason quite unknown practically all text-books work out bending moments in foot-tons. We may write the dimensions and treat them by the ordinary laws for fraction, and the result gives the dimension of the quantity.

For instance,

$$\text{B.M.} = \frac{\text{in.} \times \text{tons}}{\text{Stress}} = \frac{\text{in.} \times \text{tons}}{\text{tons} \div \text{in.}^2} = \text{in.} \times \text{in.}^2 = \text{in.}^3$$

We have found that in our example we require a section modulus of 36·0 and we now look down the properties of the New British Standard *I* Sections and find that the 12 × 5 × 30 (12 in. deep, 5 in. broad, and weighing 30 lbs. per ft. length) has a section modulus of 34·49, while the 13 × 5 × 35 has a section modulus of 43·62. We choose the latter because although the 12 × 5 × 30 is nearly strong enough the weight of the beam itself has to be taken into account, and this will increase slightly the section modulus required.

Position of Neutral Axis.

In the case of pure bending—that is when, as is usual, all the load is at right angles to the centre line of the beam—the neutral axis passes through the point called the centroid of the section. Some writers call this point the centre of gravity, but strictly the latter term applies only to solid bodies and not to areas.

In cases such as rectangles, circles, *I* and other symmetrical sections the centroid is the same as the intersection of the centre lines, and it is not necessary to calculate its position.

In other cases, such as channels, angles, tees the position of the centroid has to be calculated, and in the case of the standard rolled sections this has been done and in the tables of their properties the positions of the centroids are given.

The method of calculation of the centroid of a section is quite simple, and will be explained in some detail later.

Moment of Inertia and Radius of Gyration.

Students who have not had the advantage of advanced mathematical training nearly always find it difficult to understand the meaning of moment of inertia; many writers have attempted to explain away this difficulty, but no one has ever succeeded entirely in removing it. Nor is it likely that they will, because the moment of inertia is an imaginary quantity and introduces to students an entirely new idea. We shall not attempt to define the moment of inertia in a new way; we shall just say what it is and how its value can be calculated in practice. The student will find that

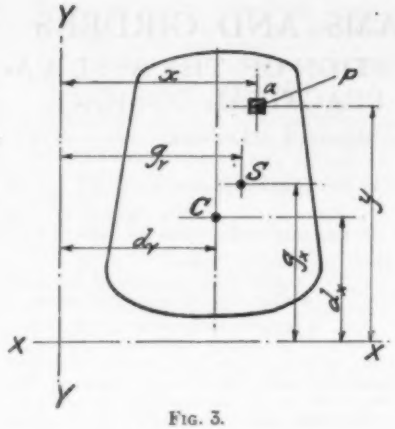


FIG. 3.

in time he will be sufficiently familiar with the idea to use it intelligently even if its actual meaning is still somewhat of a mystery to him.

Suppose we have any geometrical figure such as that shown in Fig. 3, and *XX* and *YY* are any two convenient datum lines or "axes," as they are called by mathematicians. Although theoretically these axes can be at any angle to each other they are in practice always taken at right angles to each other.

Now consider a small element of area *a* around a point *P* in the figure and let the perpendicular distances of *P* from *XX* and *YY* be *y* and *x* respectively. If the whole figure were divided up into elements of area then it is clear that the area (*A*) of the whole figure is equal to the sum of all the elements. This is written in mathematical form—

$$A = \Sigma a \quad .. \quad .. \quad .. \quad .. \quad (1)$$

The Greek letter Σ (capital S) is merely used as a universal shorthand sign to mean "The sum of all quantities like."

First Moments of Areas.

If we now imagine the element of area to be multiplied by its distance *y* from *XX* we have agreed to call the result "the first moment of the element of area about *XX*"; and if we find the first moment about *XX* of each element into which the whole figure is divided and add all the results together we obtain a quantity which we call the first moment of the figure about *XX* ($M_{,X}$).

This is expressed in mathematical form by the relation—

$$M_{IX} = \Sigma (a.y) \quad .. \quad .. \quad .. \quad (2)$$

Similarly, if we multiply the element of area by its distance *x* from the axis *YY* we can find the first moment of the figure about the axis *YY* ($M_{,Y}$), which is expressed by the relation—

$$M_{IY} = \Sigma (a.x) \quad .. \quad .. \quad .. \quad (3)$$

We next imagine a point *C*, called the *centroid*, which is such that if we multiply the area of the figure by the perpendicular distances from the axes *XX* and *YY* we obtain values equal to the first moments of the areas about these axes,

$$i.e. \quad A.d_x = M_{IX} \; .. \quad .. \quad .. \quad (4)$$

$$A.d_y = M_{IY} \; .. \quad .. \quad .. \quad (5)$$

The distances d_x and d_y are called the "*centroid distances*" It can be shown that the position of the centroid is independent of the position of the axes and we can define the centroid in the following terms: "The centroid of a figure is a point at which the whole area can be imagined to be concentrated so as to have a first moment about any axis in the plane of the figure equal to the first moment of the figure about that axis.

We will consider centroids in greater detail later.

Second Moments of Areas.

We will now extend the idea of moments of areas and imagine an element of area to be multiplied by the square of its distance from axis and call the result the "second moment of the element of area about the axis." Proceeding as before by dividing up the whole figure into elements and adding the separate second moments together, we obtain a quantity called the second moment of the figure about the axis.

This second moment is given the symbol *I* and was called by early investigators "the moment of inertia," because it resembles a quantity arising in the study of rotating bodies; this term has persisted although in application to beams and stanchions there is no question of rotation at all and this has had a great deal to do with the difficulty which students experience in understanding the subject.

Expressing the above idea in symbols we have—

$$I_x = \Sigma (a.y^2) \quad .. \quad .. \quad .. \quad (6)$$

$$I_y = \Sigma (a.x^2) \quad .. \quad .. \quad .. \quad (7)$$

Radius of Gyration.

Now imagine the whole area concentrated at a point *S*, called the *secondroid*, which is such that if we multiply the area of the figure (A) by the squares of the distances *gx*, *gy* from the given axes we obtain results equal to the second moments of the figures about these axes.

$$i.e., \quad A.g_x^2 = I_x$$

$$A.g_y^2 = I_y$$

$$\text{or } g_x = \sqrt{\frac{I_X}{A}} \quad g_y = \sqrt{\frac{I_Y}{A}}$$

The quantities of g_x, g_y are called the radii of gyration of the figure about the axes *X–X* and *Y–Y*, and there again the term is borrowed from the analogy of rotating bodies and is strictly not appropriate for beams and stanchions; the use of the term has, however, become too extensive to alter it now.

The point *S* differs from the point *C* in that the position of the point *S* depends upon the position of the axes, whereas the point *C* is the same for all axes.

In the application of these properties to beam and stanchion calculations the axes which we consider are axes known as the "principal axes of the section." They are at right angles to each other and pass through the centroid. We therefore require readily to be able to find the position of the centroid of any area.

In most practical sections this can be done by inspection, because if a section possess an axis of symmetry, that axis must pass through the centroid, and if we have two such axes, then intersection gives us the centroid at once. By "axis of symmetry" we mean one which divides the figure into two exactly similar halves, which are mirror-reflections of each other, or which bear to each other the relation of right to left hand; an axis of symmetry is, therefore, what we commonly call a "centre line."

Signs of First and Second Moments.

This brings us to the question of the signs of moments; in the same way as with moments of forces, the moments may be + or −, according as they are clockwise or anti-clockwise, so in moments of areas we call distances above the axis + (positive) and distances below the axis − (negative).

In Fig. 4, for instance, the first moment about *XX* of the element at P_1 is $a_1 y_1$, and

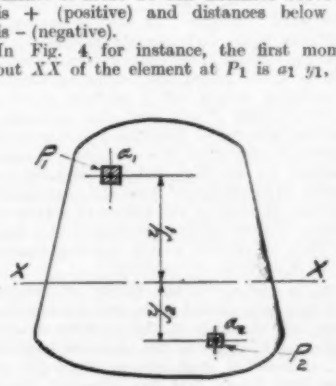


FIG. 4.

that of the element at P_2 is $-c_2 \mathfrak{z}_2$, and in finding the "sum of all the first moments of the elements," the sign must be taken into account; we therefore use the term "sum" in the algebraic sense, which means "the sum of all the positive portions minus the sum of all the negative portions. Second moments are always positive, because we are here dealing with the squares of distances and the square of a negative quantity is always positive.

Now, if we take moments about an axis passing through the centroid, the quantities corresponding to d_x and d_y in equations (4) and (5) are clearly zero, and therefore the first moments must be zero, because if we multiply any quantity by zero, the result is zero; this gives us the rule that: The first moment of any area about a centroid line is zero, or in other words, "the first moment about the centroid line of the portion of the figure above that line is numerically equal to that of the portion below that line." We can now see why an axis of symmetry passes through the centroid.

Fig. 11 represents a section having an axis of symmetry XX. For every element of area at a point P_1 above the axis there is an equal element at a point P_2 below the axis, and the moments of these two elements will be equal and opposite, so that they will neutralise each other; therefore the total first moment of the section will be zero, so that XX is a centroid line.

The other centroid axis YY has to be found by calculating the first moment of the section

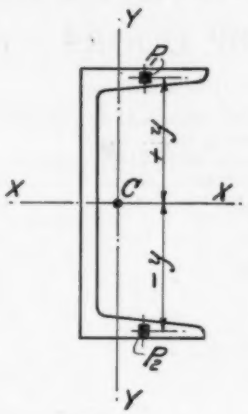


FIG. 11.

about a convenient vertical line and dividing by the area; examples of these calculations will follow.

GENERAL NEWS

Professional Announcement.

Mr. Ernest A. Newton, architect, has removed from 164 to 168, Oxford-road, Manchester. Telephone: Ardwick 3844.

New School, Romford.

The Essex C.C. have decided to acquire eight acres of land at Marshall's Park as a site for a new intermediate school and playing-fields. The plans will be prepared by the County Architect, Mr. Jno. Stuart, F.R.I.B.A., Springfield, Old Court, Chelmsford.

Harbour Construction Work, Goole.

The Aire and Calder Navigation Trustees have accepted the tender of the Yorkshire Hennebique Construction Co., Ltd., Kirkstall-road, Leeds, for the construction of a large pier at the South Dock. The structure, which will be in reinforced concrete, has been designed on Messrs. L. G. Mouchel & Partners' Hennebique system. The cost will be about £70,000.

Rebuilding Scheme at Liverpool.

Large premises in Lord-street are to be rebuilt at a cost of about £20,000. The builders are Messrs. Bovis (1928), Ltd., 43, Upper Berkeley-street, W.1. The architects are Messrs. Lewis Solomon & Son, 21, Hart-street, Bloomsbury, W.C. The quantity surveyors are Messrs. Baker & Mallett, 81, High Holborn, W.C.

Extensions to Royal Northern Hospital, Holloway.

Gifts amounting to £70,000 have been made to the Royal Northern Hospital to enable the governors to proceed with their plans for the erection of a paying patients' block of 60 beds. The plans, which have already been approved by the King Edward's Hospital Fund, have been prepared by Messrs. Adams, Holden & Pearson, FF.R.I.B.A., 9, Knightsbridge, S.W.1.

The New Imperial Chemical Building.

Messrs. John Mowlem & Co., Ltd., Ebury Bridge Works, S.W.1, are to commence preliminary works on the site of the proposed new office building in Horseferry-road and Page-street, S.W.1, for the Imperial Chemical Industries, Ltd. The architect is Sir Frank Baines, F.R.I.B.A., 13, Dean's-yard, Westminster, S.W.

The Development of South London.

On the recommendation of their Art Standing Committee the Council of the R.I.B.A. are arranging a series of special meetings at which papers on the development of London and problems of a similar nature will be read and discussed. The first of these meetings will be held at 9, Conduit-street, W.1, on Tuesday, January 15, at 5.30 p.m., when Mr. H. V. Lanchester, Vice-President R.I.B.A., will read a paper on "The Development of South London."

New Theatre, Seven Dials, W.C.

Mr. Bertie Meyer, the producer, has acquired the large site, bounded by Castle-street, Great Earl-street and Little White Lion-street, W.C.1, which has an area of 10,200 square feet, upon which is to be built a new theatre. Accommodation will be provided for 1,200 persons, including two circles. The architects are Messrs. Wimperis, Simpson & Guthrie, 61, South Molton-street, W.1.

Architects' and Surveyors' Approved Society.

The report of the Committee of Management of this Society for the year ended December 31, 1928, states that during 1928 the membership has again increased, at December 31 being 1,285 compared with 1,091 at the same date last year. Of these 200 are voluntary contributors. The Society's Benefit Fund (invested in approved securities) amounted at December 31, 1927, to £11,575 4s. 4d., equal to £9 per member. During the past year, although all claims for "additional benefits" were paid by the Society, the amount available for expenditure on same during 1928 was drawn upon to the extent of less than 40 per cent. At present 325 members are entitled to participate in this "additional benefit" scheme, and a further 85 become entitled as from January 7, 1929. The Ministry of Health has already undertaken the preliminary steps in connection with the quinquennial Government Valuation of the Society's assets as at December 31, 1927. Whilst at present the Committee are not in a position to state whether an even larger surplus than that as at December 31, 1922, will be disclosed as the result of this valuation, they have every reason to believe that the general financial stability of the Society is such that, when the fresh scheme of additional benefits, due to supersede the present one in 1930, is decided upon, the present scale of such benefits will be maintained.

THE R.I.B.A.

Examination for Candidature as District Surveyor in London.

We have received the following from the R.I.B.A.:—

It is to be regretted that more candidates do not sit for this Statutory Examination, which should be taken by all students who are anxious to test their knowledge in building craft, whether they intend to apply for appointments as District Surveyors or not, as the examination is a strictly practical one and the preparation for the examination is an excellent training.

The London County Council are anxious to increase the number of architects qualified for appointment to District Surveyorships. All the appointments are to districts the fees of which amount to at least £1,000 per annum, and it is felt that were this fact better known many more practising architects would present themselves for examination by the Royal Institute of British Architects with a view to obtaining the certificate of competency required under Section 140 of the London Building Act, 1894. The appointments for which the Council invites applications by advertisement are, it should be noted, for the less lucrative districts, as it is the Council's practice to appoint the District Surveyors of proved capacity to the more lucrative districts as vacancies occur.

Examinations, November and December, 1928.

The questions set at the Intermediate, Final, and Special Examinations held in November and December, 1928, have been published, and are on sale at the Royal Institute, price 1s. (exclusive of postage).

MEETINGS

SATURDAY, *January* 12.

Architectural Association. Professor C. H. Reilly on "The New Liverpool Cathedral." 3 p.m.

Association of Architects, Surveyors and Technical Assistants. Visit to Messrs. Austin Reed, Ltd., 107, Regent-street.

MONDAY, *January* 14.

Architectural Association. Mr. R. L. Hobson on "Chinese Art.' 8 p.m.

Edinburgh Architectural Association. Debate with the Students' Society of the "Faculty of Surveyors of Scotland." 8 p.m.

TUESDAY, *January* 15.

Royal Institute of British Architects. Mr. H. V. Lanchester on "The Development of South London." 5.30 p.m.

College of Estate Management. Captain W. T. Creswell on "Arbitration—Evidence and the Examination of a Witness." 5.30 p.m.

London Society (Children's Lecture). Mrs. R. E. M. Wheeler on "London's Burning." At the London Museum, S.W.1. 4 p.m.

WEDNESDAY, *January* 16.

L.C.C. Central School of Arts and Crafts. Sir Banister Fletcher on "Belgian and Dutch Renaissance (1500-1900)." 6 p.m.

Northern Architectural Association. Mr. S. F. Bestow on "Banks." 7.30 p.m.

Liverpool Architectural Association. Mr. Clough Williams-Ellis on "Port Meirion."

Royal Society of Arts. Professor C. R. Darling on "The Domestic Smoke Problem: a Practical Solution." 8 p.m.

Institution of Civil Engineers. Discussion on "Merits and Demerits of Alternative Methods of Taking Water for Modern Power Stations from Tidal Waters," by Mr. H. H. Dalrymple-Hay. 6 p.m.

THURSDAY, *January* 17.

Victoria and Albert Museum. Mr. I. de Bruyn on "Rembrandt Etchings." 5.30 p.m.

Society of Antiquaries. Ordinary Meeting. 8.30 p.m.

Southern Counties Federation of Building Trades Employers. Annual General Meeting and Luncheon. At the Connaught Rooms, Great Queen-street, W.C.2. 10.30 a.m.

THE BUILDING TRADE

SOME OLD LEDGE DOORS

BY ERNEST HAWKING (Curator, Geffrye Museum).

IN the late seventeenth and early eighteenth centuries, ledge doors were frequently used in all classes of dwellings, from the castle to the cottage. Why this sudden alteration in construction should have taken place about 1680 it is rather difficult to say; when a change occurs it is generally owing to one of three reasons: Fashion, new tools, or new materials that may have become available. The change could not have been due to fashion, as many of these doors were made to appear on one side as ordinary framed-up doors; neither, I think, was it connected with any new tools that had come into the hands of our craftsmen; there remains the third reason, new materials, which most likely was the deciding factor.

Although imported pine itself was not new to our workmen, it was at that time coming on the market in a new form. About 1670 or 1680 there began to be imported from the Continent boards that had been cut by the power-saws of Norway, Sweden and Germany, in thicknesses varying from 1½ in. to ¼ in.; these were of a very good quality and splendidly sawn, and when they reached our joiners, were well seasoned, especially the thin stuff, bearing in mind the time taken in bringing the wood from the Continental ports and getting it distributed on this side.

Glue, again, to the average joiner, was a relatively new thing; although it had been used occasionally at an earlier time it had only been used in small quantities and upon very special work; the cost and the difficulty in procuring or making glue, down to near the end of the seventeenth century, was sufficient to keep it from general use. I think, therefore, that these ready-sawn boards and the easier accessibility to glue, were the prime factors in the introduction of the glued type of batten door.

We know that the ordinary modern ledge door is very liable to warp because the material used is often immature wood, sappy, and rarely well-seasoned; whereas, with these old doors which we are considering, we find the wood of a good width, well-grown, and generally free from serious defects, the result being that they rarely went out of true.

For a long time we have taught the theory that in construction no glueing should be made which prevents the natural shrinking or swelling of the wood. These old doors show us that this is correct; in every case where the ledges have been glued the glued joints of the boards have broken, or the boards have split, and this in spite of the good and dry material used in their making.

Figs. No. 1 and No. 1A, together with the section No. 1 shown on the drawing, illustrate a door recently taken from Gray's Inn, measuring 6 ft. 11 in. by 3 ft. 2 in.; it was an inside door and opened outwards. The moulded ledges and the stiles front and back are glued to the board forming the panels, while the thin filling-in boards at the back were jointed, glued at the top and bottom and bradded at the sides. It will be seen that the board forming the groundwork has split, whilst those at the back have given at the joints and slightly cast, with the exception of those fixed with glue at the top and bottom. The hinges are of wrought iron secured with nails, which are clinched at the back; these were fixed before the stile which goes over them.

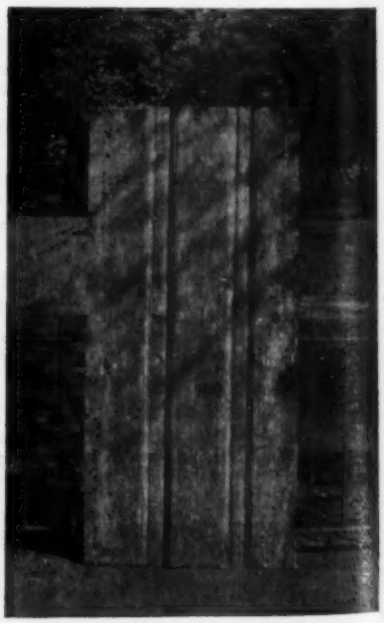
Inside, the door was secured by means of two necked wrought-iron clips, two bolts and the lock. The keyholes and escutcheons indicate that five locks have been used at different times. The first keyhole has been blocked up with wood, but shows that a very large key

No. 1.

No. 1A.

No. 2.

No. 3.



No. 4.

was used. The second, with the existing wrought-iron escutcheon, also had a large key. The third had a round hinged key, the square wrought-iron escutcheon of which still remains. The fourth was a nineteenth-century lock with a much smaller key, and the last a Yale. The first four locks must have lasted over 200 years, giving the average life of a good lock in constant use as between 50 and 55 years, and the tendency has been to use smaller keys on the occasion of each renewal.

Fig. 2 shows the back of a door 6 ft. 4 in. by 2 ft. 4 in., constructed exactly as Fig. 1, with the exception of the sham stiles at the back, which do not go to the top and bottom but are mitred just above and below the hinges. This door opened inwards, and therefore the hinges are on the back. It was taken from the Ironmongers' Almshouses (now the Geffrye Museum), which were built in 1715. All the interior doors of this building were made similar, and in every case were in good working order down to 1912, when the building was converted into a woodworking museum. All the doors, again, showed that four or five locks had been used on each.

Fig. 3 is of a very interesting type. It measures 6 ft. by 2 ft. 6 in. and is only nailed, no glue being used on any part, the three boards forming the ground and the moulded ledges, stiles and muntins being all of equal thickness, about $\frac{5}{8}$ in. All the ledges, etc., are nailed from the front, the muntins hiding the joints of the boards. This door, of necessity, required a different type of hinge, which again is of wrought iron.

The next door illustrated is the simplest in construction, but very effective in appearance; it measures now 6 ft. 3 in. by 2 ft. 8½ in.; a piece of the right-hand board appears to have been taken off—probably the three boards were originally the same width.

There is a ledge door still being used in Holyrood Palace (see drawing Fig. 5). For the elevation of one corner and section the ledges are dovetailed into the face of the stiles, thus forming a kind of brace. This door is flush on both sides, the spaces between the stiles being filled in with boards running the same way as the ledges. The first four doors are now exhibited in the Geffrye Museum. Nos. 1, 2 and 5 form a good series of this interesting and instructive method of construction, which was for 40 or 50 years used for inside doors where both sides were seen. Nos. 3 and 4 were intended to be used when one side was principally seen. In appearance, both are quite pleasing. The only objection that can be taken is that the bottom ledge of No. 3 is too narrow; again, probably this has been cut, as at one time the door was hinged on the other hand.

THE HOUSING SUBSIDY

SIR,—I note that Mr. B. S. Townroe, in your issue of December 28, 1928, is still concerned about what he describes as the "unfair character" of the Memorandum prepared by me for the National Housing and Town Planning Council Conference. Permit me to comment briefly upon Mr. Townroe's letter. He may be interested to learn that I had read the comments upon the Memorandum by the Journal of the Garden Cities and Town Planning Association. While, of course, I disagreed with them, they were in the nature of legitimate criticism to which objection cannot be taken; but I am too busy to enter into controversy with everyone who may differ from me upon this or other matters. Such criticism is quite a different thing from the suggestion made by Mr. Townroe that I was misleading the public from political motives, and which I dealt with in my letter in your columns.

The official pronouncement of the Building Trades Employers on the continuance of the subsidy is as well known to me as it is to Mr. Townroe. My quotation from it was to show that the claim of the Ministry, supported by Mr. Townroe, that subsidy reduction had reduced building costs was without foundation. I note Mr. Townroe now admits that point.

It may be useful, however, for Mr. Townroe to know that the building employers, more particularly the speculative section, are not entirely disinterested in this matter of the subsidy. They might welcome the subsidy under the 1923 Act, because, in the main, it went into their pockets; but the subsidy under the 1924 Act, which was in aid of *reducing* the rent of houses to let, was a direct menace to their interests as large owners of cottage property. Apart from that view, anyone may argue that the general subsidy of any industry is not desirable in itself.

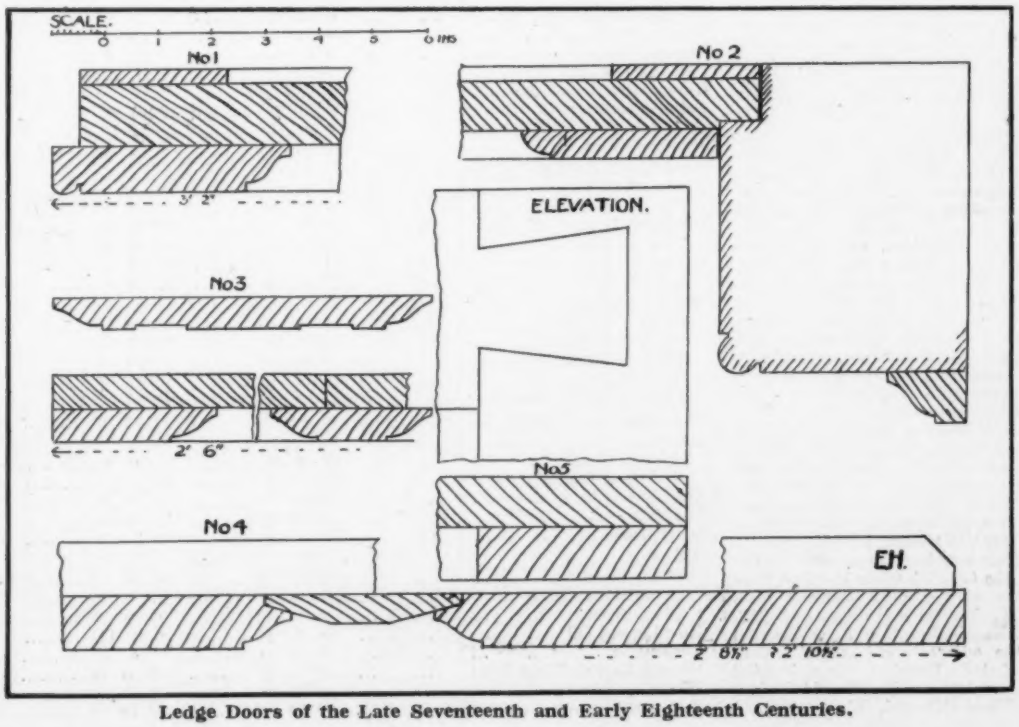
I am duly grateful for the advice tendered by Mr. Townroe that I should study the 1924 Act and its schedules; but I am afraid the only possible retort is that Mr. Townroe should himself read the documents, and this time read them with understanding. When he does he will find that the number of houses built with State assistance was not 212,916, but almost 230,000. Obviously Mr. Townroe has forgotten Scotland, and this enables us to gauge the worth of his other deductions.

Mr. Townroe, for reasons best known to himself, states: "He is glad to see in his letter he has now quietly dropped his accusation of breaking pledges and admits the Government has the power to revise the subsidy." As this refers to something which cannot possibly be read into my letter, I can only describe it as journalistic adroitness, and I have neither time nor inclination to attempt to rebut it.

The broad general facts remain as stated in my Memorandum. An agreement was arrived at between the Government and the building industry. Relying on this, the operatives allowed large numbers of men and boys to enter the industry. Owing to the Ministry reducing the subsidy, the whole programme of house-building has been upset, and 120,000 building trades' operatives put upon the streets. No special pleading by Mr. Townroe, or any other official or unofficial apologist for the Government, can alter these facts.

Finally, if Mr. Townroe is convinced that the National Housing and Town Planning Council should withdraw my Memorandum, or that I should revise it, the proper place to raise the matter is at a meeting of the Council, where his strictures on the Memorandum can have the handling they deserve, without occupying further of your valuable space.

THOMAS BARRON,
President of the National Federation of Building Trades Operatives.



Ledge Doors of the Late Seventeenth and Early Eighteenth Centuries.

NEW BUILDINGS IN LONDON

Bloomsbury.—IMPROVEMENTS.—The trustees of the British Museum have submitted to the Royal Commission on National Museums and Galleries a scheme for the reorganisation and expansion of the accommodation at the reading room of the library. It is also proposed to extend at the newspaper department at Hendon.

Bouverie-street.—REBUILDING.—The contract for the rebuilding of the premises at No. 10, for the proprietors of "Punch," has been placed with Messrs. Dove Bros., Ltd., Cloudesley-place, W.1. The work will be carried out under the supervision of the architects, Messrs. Thompson and Walford, 1, Leadenhall-street, E.C.3. The contract price is approximately £35,600.

Campden Hill-road.—REBUILDING.—Messrs. R. H. and J. Pearson, Ltd., builders' merchants, are contemplating the rebuilding of their premises at Nos. 164-168.

Carshalton.—SCHOOLS.—Four new elementary schools and one secondary are to be built at Carshalton on the L.C.C. housing estate for the Council.

Charlton Park.—HOUSES.—Messrs. Charlton Park, Ltd., have authorised the erection of a further 100 houses on their estate. The builders are Messrs. Fretho, Ltd., Highlands-mansions, Tranquil Vale, S.E.3.

Chelsea.—ADDITIONS.—The governors of the Oratory Central School, Stewart-road, S.W.3, have decided to build additional classrooms, etc., and carry out structural alterations at a cost of approximately £16,000. The builders are Messrs. Bovis (1928), Ltd., 43, Upper Berkeley-street, W.1. The plans have been prepared by Messrs. Christie and Barnum.

Ealing.—HOUSES.—Mr. S. H. West, architect, The Mall, Ealing, W.5, has prepared plans for the erection of 24 houses in Queen Anne's-gardens, W.5, for Mr. F. Byford.

Ealing.—ADDITIONS.—The Town Council has sanctioned plans for alterations and additions at "The Railway Hotel," in Oldfield-lane, for Messrs. Watney, Combe, Reid & Co., Ltd. The architects are Messrs. F. J. Fisher & Son, of 35, John-street, Bedford-row, W.C.1.

Holland Park.—BANK.—The Westminster Bank, Ltd., have decided to erect new premises, and have placed the building contract with Messrs. Bovis (1928), Ltd., 43, Upper Berkeley-street, W.1. The plans have been prepared by Mr. Arthur Keen, F.R.I.B.A., 4, Raymond-buildings, Gray's Inn, W.C.

Islington.—HOME.—Work is about to be proceeded with in connection with the new nurses' home at the St. John's-road Institution for the Islington (St. Mary) Board of Guardians, the plans for which were originally prepared by the late Mr. E. J. Harrison, architect to the Guardians, and which are now in the hands of Messrs. Vine and Vine, A.R.I.B.A., of 12, Tudor-chambers, Station-road, Wood Green, N.22. The contractors are Messrs. Bridge and Co., of Brixton, London. The building is of brick construction, and when completed will provide accommodation for some 60 nurses. Details were incorrectly given in our issue for December 28.

Kensal-road.—ADAPTATION.—The Cecil Public Women's Lodging Houses Fund have decided to adapt a large house at 194, Kensal-road, N.W., as a hostel. The builders are Messrs. Chilcott and Austel, Ltd., 20, Bishops-gate-avenue, E.C.3. The plans have been prepared by the hon. architect, Mr. Ralph Knott, F.R.I.B.A., Adelphi-terrace House, W.C.2.

King William-street.—CONVERSION.—The governors of the Charing Cross Hospital have authorised the placing of a contract with Messrs. E. K. Wilson and Son, Ltd., 38, Sussex-place, Kensington, S.W.7. for the conversion of the adjacent old Royal Westminster Ophthalmic Hospital into a hospital annexe. The architect is Mr. Harold Goslett, F.R.I.B.A., Theobalds-road, W.C.

Mitcham.—HOUSES.—Forty-two houses are to be built in two new streets off Love-lane, for Mr. H. Poulson.

Mitcham.—BUILDING.—Messrs. Hadfields, Ltd., of Merton, have submitted plans to the Mitcham Urban District Council for the erection of a factory building in Western-road. The application has been approved.

Muswell Hill.—HOSPITAL.—The property has been acquired at the Muswell Hill end of Woodside-avenue occupied by Norton Lees, Roseneath and Leawood, by the St. Luke's charity, Old-street, E.C., and a contract has been placed with Sir Walter Lawrence & Son, Ltd., of Sun-street, Finsbury, for the erection of a mental hospital, and the alteration of two of the present buildings to provide accommodation for the staff. The contract amounts to £80,000, and the architect is Mr. Thomas A. Pole, F.R.I.B.A., of Jermyn-street, S.W.1.

New Bridge-street.—PREMISES.—The branch restaurant of the Aerated Bread Co. is to be reconstructed. The builders are Messrs. Clement Bros., Ltd., 77, Derby-road, E.7, whilst the shop equipment will be fitted by the Imperial Shopfitting Co., 72, Golden-lane, E.C.1.

Oxford-street.—RECONSTRUCTION.—The two shops, with offices above, at Nos. 534-536, are to be reconstructed, under the direction of Mr. Frank Swain, surveyor, 170, Notting Hill-gate, W.11. The builders are Messrs. Perry and Perry, 20, Woodstock-street, W.1.

Putney.—ADDITIONS.—Alterations and additions are being made to Fulham House by Messrs. H. King & Son, builders, to the plans prepared by Mr. F. Clive Grimwade, F.S.I. The constructional steelwork will be supplied by Messrs. Young & Co., 6, Queen Anne's-gate, Westminster, S.W.1.

Richmond.—BUILDING.—The Board of Guardians have decided to issue instructions to their architects, Messrs. Brewer, Smith and Brewer, 11, The Green, to obtain tenders for the improvement of the dining hall and laundry blocks.

St. George's.—RECONSTRUCTION.—A contract has been placed with Messrs. L. and W. Whitehead, Ltd., 169, Clapham-road, S.W.9, for the reconstruction of premises in Berners-street, E., to form the new Bernhard Baron Jewish Girls' Settlement. The plans have been prepared by Messrs. Hobden and Porri, 37A, Finsbury-square, E.C.2, and the quantity surveyor is Mr. Arthur G. Cross, 28, Victoria-street, S.W.1. The cost is estimated at £65,000.

St. Martin's-le-Grand.—OFFICES.—The site at the junction of St. Martin's-le-Grand and Cheapside, E.C.2, has been sold, and an office building will be erected in the near future. The surveyors are Messrs. Chesterton & Co., High-street, Kensington, S.W.

Stoke Newington.—HOUSES.—Additional houses are to be erected in Woodberry Down, N.W., for the Rock Estates. The plans have been prepared by Mr. Stanley Hunt, A.R.I.B.A., 70, Finsbury-pavement, E.C.2.

Strand.—RECONSTRUCTION.—The whole of the interior of the Gaiety Theatre, Aldwych, W.C., is to be reconstructed, including the abolition of the pit. The building will also be completely redecorated. The work will be under the direction of Mr. Bertie Crewe, 75, Shaftesbury-avenue, W.1.

Ufford-street.—ADDITIONS.—Additions and improvements are to be made to the Union offices in Ufford-street and Blackfriars-road, S.E.1. Plans have been prepared by Messrs. A. Saxon Snell and Phillips, FF.R.I.B.A., 9, Bentinck-street, Manchester-square, W.1.

Whitton.—STATION.—The Southern Railway Co. are negotiating for the erection of a new station in Percy-road. The plans will be prepared by the company's architect.

Wimbledon Park.—BATHS.—A committee of the Wimbledon Town Council has instructed the Borough Surveyor to submit proposals for the construction of an open-air swimming bath.

COMPARISON OF PRICES OF BUILDING MATERIALS ON JANUARY 1st, 1928, WITH CURRENT PRICES.

Materials.	Jan. 1, 1928. £ s. d.	Jan. 1, 1929. £ s. d.	Rise. %	Fall. %
Bricks—				
Best Stocks	4 5 6	4 5 6	—	—
Flettons	2 14 3	2 12 3	—	3.69
Glazed	21 0 0	21 0 0	—	—
Thames Ballast	0 10 6	0 9 9	—	7.14
Thames Sand	0 14 6	0 12 6	—	13.79
Shingle (¾ in.)	0 12 9	0 12 0	—	5.88
Portland Cement	2 13 0	2 6 0	—	13.32
Ground Blue Lias Lime	1 17 6	1 17 6	—	—
Grey Stone Lime	2 10 9	2 10 9	—	—
Bath Stone	0 2 10	0 2 10	—	—
Portland Stone	0 4 4½	0 4 4½	—	—
Good Sound Building Timber—				
4 in. × 11 in.	30 0 0	30 0 0	—	—
3 in. × 11 in.	25 0 0	25 0 0	—	—
2 in. × 11 in.	26 0 0	26 0 0	—	—
3 in. × 9 in.	24 0 0	24 0 0	—	—
3 in. × 7 in.	22 0 0	22 0 0	—	—
3 in. × 4 in.	21 0 0	21 0 0	—	—
Slates— per 1000				
24 in. × 12 in.	32 18 4	32 18 4	—	—
22 in. × 12 in.	29 17 11	29 17 11	—	—
20 in. × 10 in.	22 10 0	22 10 0	—	—
16 in. × 10 in.	15 12 6	15 12 6	—	—
16 in. × 8 in.	12 3 9	12 3 9	—	—
R.S. Joists	12 10 0	12 10 0	—	—
Iron—				
Common Bars	13 0 0	11 0 0	—	15.39
Mild Steel Bars	10 0 0	10 0 0	—	5.26
Steel Bars	10 0 0	10 0 0	—	—
Cut Nails	19 0 0	18 0 0	—	—
Sheet Lead	31 0 0	29 10 0	—	4.84
Glass—				
15 oz. Sheet	0 0 2¼	0 0 2¼	—	9.09
21 oz. Sheet	0 0 4	0 0 3½	—	12.50
26 oz. Sheet	0 0 4½	0 0 4	—	11.11
Raw Linseed Oil	0 3 1	0 2 11	—	5.41
Turpentine	0 3 10	4 4	13.04	—
Ground English White Lead	47 5 0	52 0 0	10.05	—
White Lead Paint	66 15 0	70 10 0	5.62	—
Red Lead	38 10 0	39 10 0	2.59	—

RATES OF WAGES IN THE BUILDING TRADE

[Every endeavour is made to ensure accuracy but we cannot be responsible for errors.]

	Masons.	Bricklayers.	Carpenters Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Labourers.
Aberdare	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Accrington	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Aldershot	1/4	1/4	1/4	1/4	1/4	1/4	1/0	1/0
Alfreton	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Alnwick	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Altrincham	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Ashford Kent	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Ashington	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Ashton-under-Lyne	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Aylesbury	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Ayisham	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Banbury	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Barnsley	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Barnstaple	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Barrow-in-Furness	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Barry	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Basingstoke	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Bath	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Bedford	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Berwick	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Bexhill	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½	1/0½
Birkenhead	1/10	1/10	1/10	1/11	1/10	1/10	1/9½	1/4½
Birmingham	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Bishop Auckland	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Blackburn	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Blackpool	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Bolton	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Bournemouth	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Bradford	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Bradford-on-Avon	1/4	1/4	1/4	1/4	1/4	1/4	1/3	1/0
Braintree	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Brentwood	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Bridgwater	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Bridlington	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Brighton	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Bristol	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Bromsgrove	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Bromyard	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	11½
Bungay	1/3	1/3	1/3	1/3	1/3	1/3	1/3	11½
Burnley	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Burton-on-Trent	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Bury	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Buxton	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Cambridge	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Canterbury	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Cardiff	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Carlisle	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Chatham	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Chelmsford	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Cheltenham	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Chester	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Chesterfield	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Chorley	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Cirencester	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/3½	1/0½
Clacton	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Colchester	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Coventry	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Cranbrook	1/3	1/3	1/3	1/3	1/3	1/3	1/3	11½
Crewe	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Cromer	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Darlington	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Deal	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Denbigh	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Derby	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Devizes	1/4	1/4	1/4	1/4	1/4	1/4	1/3	1/0
Dewsbury	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Doncaster	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Dorchester	1/4	1/4	1/4	1/4	1/4	1/4	1/3	1/0
Dorking	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Dovercourt	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Driffield	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Droitwich	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Dudley	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Durham	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Eastbourne	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
E. Glam. (Mon. Val.)	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Ely	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Exeter	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/5½	1/2
Exmouth	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Fakenham	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Felixstowe	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Folkestone	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Frome	1/4	1/4	1/4	1/4	1/4	1/4	1/3	1/0
Glossop	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Gloucester	1/6	1/6	1/6	1/6	1/6	1/6	1/5	1/1½
Godalming	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Goole	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Gosport	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Grantham	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Great Yarmouth	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Grimsby	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Guildford	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Halifax	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Harpenden	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Harrogate	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Hartlepools	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Harwich	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Hastings	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Hatfield	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Hednesford	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Hereford	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/4½	1/1½
Herne Bay	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Hertford	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Hitchin	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Hoddesdon	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Holt	1/3	1/3	1/3	1/3	1/3	1/3	1/3	11½
Huddersfield	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Hull	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Hunstanton	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Huntingdon	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Isle of Wight	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	11½
Ipswich	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Keighley	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Kettering	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Kidderminster	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
King's Lynn	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Lancaster	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Leamington Spa	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Leeds	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Leicester	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Leighton-Buzzard	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Lichfield	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Lincoln	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Littlehampton	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Liverpool	1/10	1/10	1/10	1/11	1/10	1/10	1/9½	1/4½
Llandudno	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Llanelly	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
London:								
12 m. radius	1/9	1/9	1/9	1/9*	1/9	1/9	1/8	1/4
12-15 m. radius	1/8½	1/8½	1/8½	1/8½*	1/8½	1/8½	1/7½	1/3½
Loughborough	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Lowestoft	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Luton	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Macclesfield	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Maidstone	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Malvern	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Manchester	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Mansfield	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Margate	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Market Harb'rough	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Matlock	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Melton Constable	1/3	1/3	1/3	1/3	1/3	1/3	1/3	11½
Melton Mowbray	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Merthyr Tydfil	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Middlesbrough	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Newark	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Newbury	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Newcastle-on-Tyne	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Newcastle-ur-Lyme	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
New Forest	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Newmarket	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Newport, Mon.	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Northampton	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Norwich	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Nottingham	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Nuneaton	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Oakham	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Oldham	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Oxford	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Paignton	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Peterborough	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Plymouth	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/6½	1/2½
Pontypridd	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Portsmouth	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Preston	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Ramsgate	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Reading	1/6	1/6	1/6	1/6	1/3	1/6	1/6	1/1½
Redcar	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Redditch	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Reigate	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Retford	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Ripon	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Rochdale	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Rochester	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Rugby	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Saffron Walden	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	11½
St. Albans	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
St. Helens	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Sawbridgeworth	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Saxmundham	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	11½
Scarborough	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Sevenoaks	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Sheffield	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Shrewsbury	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Sittingbourne	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Southampton	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Southend-on-Sea	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Southport	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
South Shields	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Stevenage	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Stockport	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Stockton-on-Tees	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Stoke-on-Trent	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Stourbridge	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Stourport	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Stowmarket	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Stratford-on-Avon	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Stroud	1/5	1/5	1/5	1/5	1/5	1/5	1/4½	1/0½
Sunderland	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Swaffham	1/3	1/3	1/3	1/3	1/3	1/3	1/3	11½
Swansea	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Swindon	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/4½	1/1½
Tamworth	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Taunton	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Thetford	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Torquay	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Totnes	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4	1/0½
Trowbridge	1/4	1/4	1/4	1/4	1/4	1/4	1/3	1/0
Tunbridge Wells	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Uttoxeter	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/0½
Wakefield	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Walsall	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Wallsend	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Warminster	1/4	1/4	1/4	1/4	1/4	1/4	1/3	1/0
Warrington	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Warwick	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Wells (Norfolk)	1/3	1/3	1/3	1/3	1/3	1/3	1/3	11½
Welwyn Gar. City	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
West Bromwich	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Weston-sup.-Mare	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/5½	1/1½
Weymouth	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/3½	1/0½
Whitby	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/6½	1/2
Wigan	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Winchester	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Windsor	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Wisbech	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Wolverhampton	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½
Woodbridge	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/0
Worcester	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Worksop	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/1½
Worthing	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/4½	1/0½
Wrexham	1/7	1/7	1/7	1/7	1/7	1/7	1/7	1/2½
Wroxham	1/3	1/3	1/3	1/3	1/3	1/3	1/3	11½
Wymondham	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	1/3½	11½
York	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/2½

* The rate recognised by the National Association of Plasterers, Granolithic and Cement Workers, is 1/9½ plus travelling expenses, equalling 2/– a day and 1/– for Saturdays, whether employed in shop or on job—day or night work.

For rates of wages in the Building Trade in Scotland, see page 140.

NEW CINEMAS

Bournemouth.—The Town Council has passed plans for a cinema in Christchurch-road, Pokesdown, for Mr. S. Kermode.

Bradford.—The Corporation Licensing Committee has approved plans for a 3,000-capacity cinema for the Provincial Cinematograph Co., for whom Mr. W. E. Trent, 123, Regent-street, W.1, is architect. A restaurant and dance hall are provided for.

Dover.—The Council have approved plans for the erection of a new picture theatre on a site in Castle-street for the directors of the Dover Theatre Syndicate, Ltd., London, W.1.

Ipswich.—The Provincial Cinematograph Theatres, Ltd., have placed a contract with Messrs. McLaughlin and Harvey, Ltd., 24, Highbury-grove, N.5, for the new picture theatre announced in our issue for October 26. The architect is Mr. William Trent, 123, Regent-street, W.1.

Liverpool.—The Theatres and Public Entertainments Committees have approved plans for two new cinemas, propositions which were announced in our last issue. The first is for Mr. R. Duncan French at North Hill-street, and will accommodate 1,200 and cost £25,000. The second will be put up at Stanley-road and Falstaff-street for Mr. Harold Platt.

Llanelly.—The contract for the cinema at Llanelly—given in our issues for October 19 and November 2, 1928—has been awarded to Messrs. W. Evans & Co., of Swansea. The architect is Mr. S. R. Crocker, Portland-road, Swansea.

Middlesbrough.—Messrs. Coke & Lawson, architects, of Central Chambers, Front-street, Chester-le-Street, are preparing plans for erection of the proposed new cinema in Bridge-street.

North Shields. — A company has been formed with £30,000 capital to demolish the present buildings on a site in Russell-street, North Shields, and to erect thereon a theatre. Mr. Dixon Scott, 39, Percy-gardens, Tynemouth, is intimately connected with the scheme.

Queen's-road.—Messrs. Ralph Pay & Taylor, 3, Mount-street, W.1, have disposed of a site near Queen's road Bayswater, Metropolitan Station, for the erection of a super-cinema to hold 3,000. The architects are Messrs. Tapperell & Haase, 5, Stratford-place, W.1.

Sale.—The Brooklands Theatre Syndicate has acquired a corner site having a frontage to Brooklands-road and Framingham-road, Brooklands, where they propose to erect a new repertory theatre and a cinema. The preparation of plans has been entrusted to Messrs. E. Ogden & Co., architects and surveyors, 1, Ridgfield, Manchester.

Scunthorpe.—A local concern, the Royal Cinema Company, have decided to build a new picture theatre at the corner of Chapel-street and Gilliatt-street, with seating accommodation for 1,000 persons. The builders will be Messrs. H. J. Thompson, Ltd., Scunthorpe.

Southend-on-Sea.—Plans—which it was announced in our issue for December 7 were before the Corporation—have now been passed for the erection of a new cinema at London-road, Leigh, on the corner of Bellair's-drive, for Mr. George Martin.

Smethwick.—Plans for a new cinema in Bearwood-road, Smethwick, for Mr. E. Hewitson, have been approved by the Corporation. The architect is Mr. Horace Bradley, of Temple-row, Birmingham.

Stockport.—Plans have been approved by the Stockport Corporation Committee for the proposed cinema and billiards hall in Buxton-road, which was announced to be undertaken in our issues for November 9 and 30, 1928. Mr. Charles Hartley, 128, Buxton-road, Stockport, is the architect.

Calendars.

We have received and acknowledge with thanks calendars from Messrs. Entwistle, Thorpe & Co., Ltd., the Strand Engraving Co., Ltd., and Mr. R. K. Burt.

CONTRACTS, COMPETITIONS, &c.

For some contracts still open, but not included in this List, see previous issues. Those with an asterisk are advertised in this number. Certain conditions beyond those given in the following information are imposed in some cases, such as that advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed, that no allowance will be made for tenders; and that deposits are returned on receipt of a bona-fide tender unless stated to the contrary.

The date given is the latest date when the tender, or the names of those willing to submit tenders, may be sent in, the name and address at the end is the person from whom or place where quantities, forms of tender, etc., may be obtained.

Following is a list of abbreviations:—Borough Surveyor, B.S.; Borough Engineer, B.E.; District Surveyor D.S.; Clerk, C.; Town Clerk, T.C.; County Engineer, C.E.; County Surveyor, C.S.; County Architect, C.A.; Surveyor, S.; Engineer, E.; Borough Architect, B.A.: Architect, A.

BUILDING, PAINTING, ELECTRIC LIGHTING, HEATING, etc.

JANUARY 14.

Beaconsfield.—Houses.—22 non-parlour cottages on the Ronald-rd. site, for U.D.C. J. H. Crosby, S. and E. Dep. £2 2s.

Broadstairs and St. Peter's.—Wall.—For (*a*) a retaining wall adjoining The Parade, Broadstairs, and for reinstatement of section of The Parade; and (*b*) a concert pavilion at Garden-on-the-Sands, for U.D.C. E. F. Owen, clerk. Dep. £5.

***Budleigh Salterton.**—New Fire Station and Council Yard.—Erection of, at Budleigh Salterton. Rogers, Bone & Coles, architects, 9, New-square, Lincoln's Inn, W.C.2. Dep. £1.

Cambridge.—Additions.—Additions and alterations to St. Andrew's Schools, Old Chesterton, comprising new offices, cloak room and porch, for Governors of the Old Schools. G. W. Teasdale, B.S., The Guildhall, Cambridge. Dep. £1 1s.

Dartmouth.—Houses.—40, for Corporation. B.S. Dep. £2 2s.

Derby.—Offices.—New offices adjoining the County Offices, St. Mary's Gate, for Derbyshire C.C. G. H. Widdows & G. C. Copestick, architects, County Offices, St. Mary's Gate, Derby Dep. £1 1s.

Great Houghton.—Installation.—Of electric light to Glass Houghton Ashton-rd. Council school and caretaker's house, for West Riding E.C. Education Department, County Hall, Wakefield.

Hambledon. — Alterations. — Also additions at "Holbrook," Shalford, for R.D.C. P. G. Williams, building surveyor, High-st., Bramley. Dep. £2 2s.

Holmfirth.—Houses.—24 on the Woodlands Housing estate; 8 at Booth House; and 20 at Fives, for U.D.C. S. Dep. £1 1s.

Hoxton.—Foundations.—Construction of, for a block of dwellings on Whitmore Estate, Hoxton, for the L.C.C. Architect to the Council, The County Hall (Room No. 3), Westminster Bridge, S.E.1. Dep. £1

Huddersfield.—Baths.—Public baths, etc., at junction of Cambridge-rd. and Claremont-st., for Corporation. L. Smith, Borough Architect, 26, Ramsden-st

London.—Installation of electric lighting and power installations, and also telephone installation, at public baths and washhouses in course of erection in Old Ford-rd., Bethnal Green, for Bethnal Green B.C. B.E. and S. Dep. £3 3s.

Norton.—Installation.—Of low pressure hot water at new school, for West Riding E.C. Education Department, County Hall, Wakefield.

Norton.—Installation.—Of electric light at new school, for West Riding E.C. Education Department, County Hall Wakefield

Rochdale.—Painting.—At Birch Hill Hospital, Dearnley, near Rochdale, for B.G. I. Clegg, clerk.

Royston.—Convenience.—Public convenience and execution of works of lay-out of open space at The Cross, for U.D.C. H. F. J. Banham, clerk.

Shoreditch.—Redecoration and Repair.—At the Town Hall, Old-st., E.C.1, for the Shoreditch Borough Council. T. L. Hustler, Borough Surveyor, Town Hall, Old-st., E.C.1.

Smethwick.—Extensions.—To Holly Lodge High School for Girls, for C.B. G. Randle, architect. Dep. £1

Stratton and Bude.—Building.—Refreshment room and public conveniences, and other works incidental thereto, on a site near Mentone, Bude, for U.D.C. F. J. Worden, surveyor, Belle Vue-av. Bude

Turriff.—Houses.—Two blocks of four-roomed houses and four blocks of three-roomed houses on Chapel-st. site, for T.C. W. L. Duncan, architect.

JANUARY 15.

Ilfracombe.—Abattoir.—Extension of abattoir at Slade, for U.D.C. F. B. Goodman, E. and S. Dep. £2 2s.

Khanka (Egypt).—Hospital.—Construction of the leprous hospital at Khanka. Inspector, East Division No. 3, Midan Ismailia, Cairo.

Rotherham.—Houses.—500, on Herringthorpe site, for C.B. V. Turner, B.E. Dep. £2 2s.

Sheffield.—Houses.—30 parlour-type houses on Longley estate, for T.C. W. Geo. Davies, F.R.I.B.A., City Architect. Dep. £2.

JANUARY 16.

Arnside.—Houses.—At Saltcotes estate, Arnside. R. Bradley Barker, F.R.I.B.A., architect.

Blackrock.—Houses.—32, at Stradbrook, and laying down of roads, sewers and watermains in connection with same, for U.D.C. S.

***Cheltenham.**—Houses.—Erection of 66 non-parlour type houses on land in Folly-lane, for the Cheltenham Corporation. T. Malvern, L.R.I.B.A., 21, Winchcomb-st., Cheltenham. Dep. £2 2s.

Dewsbury.—Building.—New basket works at Highfield House, Soothill-lane, Batley, for Institution for the Blind of Dewsbury, Batley and District. Messrs. W. Hanstock & Son, architects, Branch-rd., Batley.

Hemel Hempstead.—Houses.—Erection of 48, in blocks of four on the Elephant Farm estate, for the Corporation of Hemel Hempstead. A. Murray-Smith, A.M.Inst., C.E., Borough Engineer, Market-sq., Hemel Hempsted. Dep. £2 2s.

Lampeter.—Extensions.—To casual wards at Temple-buildings, for B.G. Bankes Price & Gwilym Davies, architects.

Oldham.—Telephone Exchange and Sorting Office.—Erection of, at Oldham, for the Commissioners H.M.O.W. Contracts Branch, King Charles-st., S.W.1. Dep. £1 1s.

Preston.—Centre.—Instruction centre in Marsh-lane, for C.B. W. Platt, B.E. and S.

Preston.—School.—Infants' school in Ribbleton-av., for C.B. W. Platt, B.E. and S. Dep. £2.

Stoke-on-Trent.—Wiring.—Also fitting of eight "electric" houses, in Avenue-rd., Hanley, for T.C. City Electrical Engineer, St. George's-chambers, Kingsway. Dep. £2.

Tynemouth.—Conveniences.—At Hawkey's-lane, for C.B. B.S. Dep. £2 2s.

JANUARY 17.

Glamorgan.—Residences.—Two residences for Assistant Medical Officers; one at Angelton and the other at Parc Gwylit, Bridgend, for County Mental Hospital Board. W. E. R. Allen, clerk to the Committee of Visitors, Glamorgan County Hall, Cardiff.

Huyton.—School.—New Council school at Huyton, for Lancashire E.C. Stephen Wilkinson, F.R.I.B.A., 16, Ribblesdale-place, Preston. Dep. £2.

Keighley.—Foundations.—Also brickwork in connection with additional boiler plant at Coney-lane power station, for Corporation. H. Webber, Borough Electrical Engineer and General Manager.

JANUARY 18.

Altrincham.—Extensions.—At County High School for Boys, for Chester County E.C. F. Anstead Brown, F.R.I.B.A., County Architect, Chester. Dep. £1 1s.

Colchester.—Houses.—Eight blocks of six houses, two blocks of four houses, and one block of two houses, on Defoe-crescent building site, for Housing Committee. B.S.

Eastbourne.—Staircases.—2 iron fire-escape staircases at Old Infirmary, for B.G. A. Hurst, clerk.

JANUARY 19.

Edinburgh.—Demolition.—Of old buildings at 1-3, Coburg-st., 25-35, Bridge-st., and 16, Church-st., Leith, for T.C. B.E.

Edinburgh.—Demolition.—Of old buildings at 1-5, Poplar-lane, 32-34, Fox-st., and 1-6, Tontine-buildings (44, Fox-st.), Leith, for T.C. B.E.

Edinburgh.—Demolition.—Of old buildings at 1a, 1, 2, 3, Marshall's-court, 20, Greenside-lane, and Nos. 34-35, Greenside-row, for T.C. B.E.

Erpingham.—Distempering.—62 houses, for R.D.C. A. R. Tuddenham, Peter's-rd., Sheringham.

Halifax.—Improvement.—Demolition of property in Ovenden-rd. and erection of six lock-up shops, for C.B. B.E. Dep. £1 1s.

Pontycymmer.—Decorating.—Interior of Tabernacle Welsh Independent Chapel. T. Williams, Henllan, Pontycymmer.

JANUARY 21.

Ash.—Houses.—Pair of houses at Ash, near Canterbury, for Kent C.C. C.A., 86, Week-st., Maidstone. Dep. £2 2s.

Brentwood.—Wiring.—Of Brentwood Mental hospital, comprising three large blocks and sundry houses and buildings, in screwed steel conduit, complete with fuseboards, etc., for Essex C.C. Couzens & Brown, 9, Old Queen-st., Westminster, S.W.1. Dep. £5 5s.

Cardiff.—Extension.—Minister's hut at Llandaff Cemetery and extension to a boundary wall at Cardiff Cemetery, for T.C. Geo. H. Whitaker, City Architect.

Cardiff.—Painting.—At Mansion House, Richmond-rd., and Hayes Fish Market premises, for T.C. G. H. Whitaker, City Architect.

***Dagenham.**—Sanitary Convenience.—Construction of underground, for men and women, at Chequers-parade, Dagenham, for the U.D.C. Acting Engineer and Surveyor to the Council, Council Offices, Becontree-avenue, Chadwell Heath, Essex. Dep. £2 2s.

Dewsbury.—Sewage.—Valves, penstocks, and other ironwork required in the extensions to Sewage Disposal Works, Mitchell Laithes, for C.B. James Diggle & Son, consulting engineers, Hind Hill-st., Heywood. Dep. £1 1s.

Farnworth.—Houses.—Ten in Fern St. and thirty in Daffodil-rd., for U.D.C. F. Ashton, E. and S. Dep. £2.

Filey.—Houses.—72 non-parlour types, and for construction of necessary street works and sewers in connection therewith, for U.D.C. H. C. Cowen, S. Dep. £1 1s.

Hendon.—Fencing.—675 yds. of wrought-iron unclimbable railings and about 370 yds. of chain

link wire fencing, at Mill Hill-park and Basing-hill recreation ground, for U.D.C. A. O. Knight, E. and S.

Hull.—Shops.—Block of four shops and eighteen tenement dwellings, Hendon-rd., for Corporation. D. Harvey, A.R.I.B.A., City Architect.

Hull.—Dwellings.—4 shops and 18 tenement dwellings, Hedon-rd., for Corporation. D. Harvey, A.R.I.B.A., City Architect.

Leamington Spa.—Cottages.—56, for T.C. J. J. Kennan, B.E. Dep. £2 2s.

Plymouth.—Repairs.—Also painting, etc., at pontoon, at Pottery Quay, for T.C. J. Wibberley, City Engineer, Surveyor and Architect. Dep. £1 1s.

Tumble.—Cottages.—Reparation works to 28 cottages at Tumble, Carmarthenshire, for Amalgamated Anthracite Collieries, Ltd. R. S. Griffiths & Partners, architects and surveyors, Tonypandy.

JANUARY 22.

Glasgow.—Sewers.—Road and sewers at Quarry-brae-st., for T.C. Director of Housing, 20, Trongate, C.1.

***Southall-Norwood.**—Cottages.—Erection of 28 on the Brickfield site, divided into six blocks, and contractors may tender for one or more blocks, for the Southall U.D.C. J. B. Thomson, A.M.Inst.C.E., Town Hall, Southall. Dep. £2 2s.

JANUARY 23.

Bingham.—Painting.—Painting and decorating of interior of Poor Law Institution, Nottingham-rd., and painting of whole of exterior woodwork, ironwork, etc., of the above-named Institution and of children's cottage home, Fairfield-st., Bingham; also interior painting and decorating at the said cottage home, for B.G. C. W. Kendrick, Council Offices. Dep. 10s.

***Chelsea.**—Articles and Works.—Execution of, for a period being from April 1 next to March 31, 1930, unless otherwise stated, for the Chelsea B.C. John T. Jeffreys, T.C., and W. R. Manning, B.S., Town Hall, King's-rd., Chelsea, S.W.3.

Darwen.—School.—Senior elementary school for 440 children on site in Avondale-rd., for T.C. B.E. Dep. £3 3s.

London.—Heating.—Accelerated low pressure hot water heating at Telephone Exchange, Norbury, S.W., for H.M.O.W. Contracts Branch, King Charles-st., S.W.1. Dep. £1 1s.

Oldham.—Houses.—Erection of 200 (Type B), on the Limeside Housing site, in blocks, for the Oldham B.C. Housing Committee. B.E. and S., Town Hall, Oldham. Dep. £2 2s.

JANUARY 24.

Newhaven.—Conveniences.—Public lavatory in town and small lavatory in cemetery grounds, Lewes, for U.D.C. C. T. Hooper, S.

***Leigh.**—Houses.—Erection of 132 non-parlour type on the Cow-lane Housing Estate, for the T.C. B.E. and S., Town Hall, Leigh. Dep. £2 2s.

JANUARY 26.

Penmaenmawr.—Houses.—2 houses at Treforris-rd., for U.D.C. J. Parry-Hughes, S. Dep. £2 2s

Purley.—Houses.—Erection of 20, at Farleigh-rd., Sanderstead, for the Coulsdon and Purley U.D.C. Gilbert A. Ballard, O.B.E., A.M.I.C.E., surveyor, 69, Brighton-rd., Purley. Dep. £5 5s.

JANUARY 28.

Belfast.—Building.—Building of Saint Simon's Church, Donegall-rd. R. M. Close, M.R.I.A.I., architect, 13, Donegall-sq. North. Dep. £2 2s.

Deptford.—Pumping Station.—Erection of engine house, boiler house, two elevated steel bunkers, square chimney shaft, subways, etc., at the Deptford Pumping Station, for the M.A.B. Chief Engineer's Dept. (Room 201), Offices of the Board, 173, Rosebery-av., E.C.1. Dep. £10.

Eldwick.—Painting.—Internal, at Eldwick Sanatorium, near Bingley, for West Riding C.C. West Riding Architect, County Hall, Wakefield.

Glasgow.—Conversion.—Of family home, St. Andrew's-st., for use as additional police headquarters, for T.C. D. Stenhouse, T.C. Dep. £3 3s.

Hammersmith.—Wall Repairs.—Repair of the river walls and coal yard walls at the Hammersmith Pumping Station, for the M.W.B. Chief Engineer, Office of the Board, Chief Engineer's Department (Room 201), 173, Rosebery-avenue, E.C.1. Dep. £2.

Lifford.—Reconstruction.—Of County Council Offices, for Donegal C.C. W. J. Doherty, architect, 12, Castle-st., Derry.

Shipley.—Houses.—109 on Albert-rd., Thackley Old-rd. and Wrose Brow-rd., for U.D.C. H. Dawson, architect and surveyor.

JANUARY 29.

***Swadlincote.**—Housing.—Erection of 80 houses, fencing and drainage, and construction of roads and sewers, on a site situate at Upper Midway, for the Swadlincote District U.D.C. Baines, Provis & Cope, A.R.I.B.A., 22, Friar-lane, Leicester.

JANUARY 31.

***Bexleyheath.**—Houses.—Erection of 80, on the Pickford-lane site, Bexleyheath, for U.D.C. W. T. Howse, Surveyor, Council Offices, Bexleyheath. Dep. £2 2s

Braintree.—Water Tower.—Erection and completion of 120,000 galls. capacity, at Braintree, for the U.D.C. Sands & Walker, Milton-chambers, Nottingham. Dep. £3 3s.

Dublin.—Premises.—At Nos. 14 and 15, Upper O'Connell-st., for Commissioners of Public Works T. Cassedy, secretary, Office of Public Works Dep. £1.

***Leeds.**—Physics Department.—Erection of, on a site adjoining Woodhouse-lane, Leeds. The Registrar, The University, Leeds. Dep. £3 3s.

Southampton.—School Buildings.—Erection of a new Science Block at Eastleigh Derby-rd. Council School, for the Southampton C.C. A. L. Roberts, F.R.I.B.A., County Architect, The Castle, Winchester. Dep. £1 1s., payable to the Hants C.C., and crossed "Lloyds Bank, Ltd., Winchester."

Swindon.—Hospital.—Erection of new Maternity Hospital at Pinehurst, for the Swindon T.C. R. J. Beswick & Son, F.R.I.B.A., Chartered Architects, 10, Victoria-rd., Swindon. Dep. £3 3s.

FEBRUARY 4.

Chertsey.—Cottages.—12 three-bedroom cottages, in blocks of four, on Bowling Green site, near Hennage-corner, Burrow-hill, Chobham, for R.D.C. Capt. H. Beeney, S.

FEBRUARY 5.

Tullamore.—Houses.—Nine at Tullamore, Offaly, for U.D.C. T. F. McNamara & Sons, architects, 5, Dawson-st., Dublin.

FEBRUARY 7.

***London.**—Repairs to Chimney Stacks.—At the various establishments of the Stepney Board of Guardians. S. McClelland, Clerk, Administrative Offices, Bancroft-rd., Mile End, E.1. Dep. £1. (Cheques payable to the Treasurer).

FEBRUARY 12.

***Essex.**—Secondary School.—Erection of Palmer's endowed proposed new Secondary School for Girls, Grays, for the Essex Education Committee. Jno. Stuart, F.R.I.B.A., County Architect, Springfield Old Court, Chelmsford. Dep. £2 2s., to F. H. Owers, County Accountant, Duke-st., Chelmsford.

NO DATE.

Carlisle.—Shop.—Branch shop at Longsowerby, for South-end Co-operative Society, Ltd. S. W. B. Jack, architect and surveyor, Lloyds Bank-chambers.

Dublin.—Additions.—Also alterations to St Alban's Hotel, Sandycove, Co. Dublin, and for building of two houses and garages on Hotel grounds. T. F. McNamara & Sons, architects, 5, Dawson-st.

Gildersome.—Installation.—Of electric light at Gildersome-st.-lane Council school, for West Riding E.C. Benj. Sheard, West Riding Education Offices, 8, St. John's North, Wakefield.

Leeds.—Hostel.—At Regent Court, Headingley, for University of Leeds. J. C. Procter & F. L. Charlton, architects, 40, Clarendon-rd. Dep. £3 3s.

Leeds.—Workshop.—Small three-story workshop in Pontefract-lane and Keeton-st. Fred Mitchell & Sons, architects and surveyors, 9, Upper Fountaine-st., Albion.

MATERIALS, etc.

JANUARY 14.

London.—Highway Materials.—For Camberwell B.C. W. Bell, B.E. and S.

JANUARY 15.

Dover.—Tar.—30,000 gallons, for T.C. Wm. Boulton Smith, B.E.

Dover.—Granite.—1,450 tons granite chippings, and 250 tons granite dust, for T.C. Wm. Boulton, Smith, B.E.

JANUARY 16.

Liverpool—Building Materials.—For T.C. W. Moon, T.C.

JANUARY 17.

Chelmsford.—Road Materials.—For R.D.C. L. A. Cozens, Highway Surveyor, Waterloo-lane.

Hornsey.—Road Materials. For T.C. W. H. Adams, B.E. and S.

Liverpool.—Builder's Materials.—For T.C. General Manager, Liverpool Corporation Tramways, 24, Hatton-garden.

Liverpool.—Joinery.—Materials, joinery and fittings required in construction of houses, for T.C. Acting Director of Housing.

JANUARY 18.

London.—Pipes, etc.—For Islington B.C. Electrical Engineer.

Spilsby.—Highway Materials.—For R.D.C. Wm Cooke Brakenridge, District Surveyor of Highways.

JANUARY 19.

Caterham.—Road Materials.—For U.D.C. P. E. Dimmock, clerk.

Stepney.—Supply and Hire of Materials.—For one year from April 1, 1929. For conditions, etc., see advert.

West Riding.—Road Materials.—For C.C. West Riding Surveyor, Wakefield.

Wokingham.—Road Materials.—For R.D.C. S.

Worthing.—Road Stone, etc.—For T.C. J. Kennedy Allerton, T.C.

JANUARY 21.

Norwich.—Road Materials.—For T.C. J. S. Bullough, City E.

Ongar.—Edge Kerb.—For R.D.C. H. C. Phillips, District S

Pickmesgate.—Highway Materials.—For R.D.C. E. Grantham, clerk, Wickham Market.

Skegness.—Road Materials.—For U.D.C. R. H. Jenkins, E. and S.

Sleaford.—Highway Materials.—For R.D.C. G. Dale, clerk.

Uckfield.—Road Materials.—For R.D.C. Capt. E. W. Ray-Johnson, Highways Surveyor.

JANUARY 22.

Belfast.—Stone, etc.—3,500 tons of 2 in. broken stone, for C.B. R. B. Donald, City S.

Cairo.—Asphalt.—6,800 metric tons of asphalt, for Tanzin Department, Cairo. Department of Overseas Trade, 35, Old Queen-st., S.W.1. (Ref. No. B.X. 4920.)

Johannesburg.—Pipes.—Steel and cast-iron pipes and cast-iron fittings, etc., for Grahamstown T.C. Department of Overseas Trade, 35, Old Queen-st., S.W.1. (Ref. A.X. 7182.)

Southall-Norwood.—Builder's Materials, for U.D.C. J. B. Thomson, E. and S.

Willesden.—Highway Materials.—For U.D.C. F. Wilkinson, E.

JANUARY 24.

Alton.—Road Materials.—For R.D.C. V. J. Gadban, 46, High-st.

Essex.—Highway Materials.—For C.C. Wm. H. Morgan, C.S.

Gravesend.—Road Materials.—For T.C. B.E. and S., 5, Woodville-ter.

JANUARY 25.

Devon.—Road Materials.—For C.C. R. M. Stone, C.S. (N.W. Division), 9a, High-st., Barnstaple.

Gainsborough.—Road Materials.—For R.D.C. E. Donelly, S.

JANUARY 26.

Hertfordshire.—Road Materials.—For C.C. A. E. Prescott, C.S.

London.—Road Materials.—For Paddington B.C. W. F. Abbiss, T.C.

JANUARY 28.

West Suffolk.—Highway Materials.—For C.C. E. H. Bond, C.S.

JANUARY 29.

Ongar.—Granite.—For R.D.C. H. C. Phillips, District S.

JANUARY 29.

East Grinstead.—Road Materials.—For R.D.C. C. Turton, E. and S.

JANUARY 30.

London.—Road Materials, etc.—For Southwark B.C. P. H. Gray, T.C.

JANUARY 31.

Cairo.—Portland Cement.—5,000 metrical tons artificial Portland cement, for Egyptian State Railways, Telegraphs, and Telephones. Chief Inspecting Engineer, 41, Tothill-st., S.W.

Liverpool.—Stoneware Materials.—For T.C. W. Moon, T.C.

FEBRUARY 1.

Amersham.—Granite, etc.—For R.D.C. A. H. Price, S.

FEBRUARY 2.

Folkestone.—Cement, for T.C. A. E. Nichols, B.E.

FEBRUARY 4.

Bridgwater.—Road Materials.—For T.C. H. P. Bishop, B.E. and S.

Ilford.—Builder's Materials.—For T.C. H. Shaw, B.E. and S.

FEBRUARY 6.

London.—Pipes, etc.—For M.W.B. Chief Engineer, 173, Rosebery-av., Clerkenwell, E.C.1.

FEBRUARY 8.

Sutton and Cheam.—Road Materials.—For U.D.C. H. Bolton, clerk.

FEBRUARY 13.

Middlesex.—Road Materials.—For C.C. A. Dryland, C.E.

FEBRUARY 15.

Doncaster.—Highway Materials.—For R.D.C. W. R. Crabtree, S.

FEBRUARY 19.

Tottenham.—Paving Materials.—For U.D.C. E. Townson, clerk.

Tottenham.—Road Materials. For U.D.C. E. Townson, clerk.

ENGINEERING, IRON AND STEEL

JANUARY 17.

Northumberland.—Strengthening.—Also resurfacing approximately 3 miles of main road, near Hexham-on-Tyne, 1½ miles near Berwick-on-Tweed, and 3½ miles near Allendale, for C.C. J. A. Bean, C.S., The Moothall, Newcastle-on-Tyne. Dep. £2 2s.

JANUARY 18.

Durham.—Reconstruction.—Widening of three small bridges situated on Stockton-Sunderland main road between Norton and Billingham, for C.C. W. J. Merrett, County E. and S., 43, Old Elvet, Durham.

JANUARY 20.

Belqas (Egypt).—Reservoir.—For power station at Belqas. Inspector of Irrigation, Zifta Circle, Mansura.

JANUARY 21.

Hertford.—Bridge.—New bridge about 20 ft. span and other work connected therewith in the Hennebique System, for T.C. Mouchel & Partners, Ltd., civil engineers, 36-38, Victoria-st., S.W.1. Dep. £5 5s.

London.—Extension.—Steelwork for extension to jetty No. 4, for Assam-Bengal Railway Co. Thos. C. Brett, secretary, Bishopsgate House, 80, Bishopsgate, E.C.2

Perth.—Reservoir.—Reservoir on Carse Burn, near North Cassochie, embankment being about 20 ft. in height; supplying and laying about 1,200 yds. of 6-in. fireclay pipe and about 6,000 yds. of iron or steel pipe of 5, 4, and 3-in. diameter; construction of a concrete service reservoir and of a break-pressure tank, at Methven, for C.C. Gilbert Thomson & Son, chartered civil engineers, 164, Bath-st., Glasgow, C.2. Dep. £2 2s.

Wigton.—Water Supply.—Supply of about 65 miles of vertically cast-iron pipes of 7 in., 5 in., 4 in., 3 in. and 2 in. diameter; together with excavation of trenches, hauling, laying, jointing and hydraulically testing of pipes; provision and fixing of necessary valves, fire hydrants; and construction in concrete of Rosley service reservoir, close service reservoir, Wood House balancing tank, and intake tanks at Townthwaite and at Greenfoot, for R.D.C. Taylor & Wallin, engineers, 1, Saville-place, Newcastle-upon-Tyne. Dep. £10.

JANUARY 23.

Whittingham.—Sewerage.—Laying and jointing complete, together with inspection chambers, of 4 in. and 6 in. earthenware surface water drains, together with the construction of a sewage disposal works, including concrete settling tank, sludge pumping wells and building, three circular sprinkling filters, humus tanks, sludge beds, etc., at the Mental Hospital, for C.C. H. B. Ward, consulting engineer, 15, Lord-st., Liverpool. Dep. £2.

JANUARY 29.

Exmouth.—Sewerage.—Laying of approximately 2,100 yds. of 12 in. and 9 in. stoneware pipe sewers, with manholes and other coptingent works, at Littleham, for U.D.C. S. Hutton, E. and S. Dep. £1 1s.

JANUARY 30.

Otley.—Extension.—Of sewage disposal works, which comprises alteration to screening chambers, constructing pump well, laying of cast-iron smudge main, construction of gauging weir, 4 new sprinklers 92 ft. diameter, humus tanks, effluent channel and effluent drain, for U.D.C. C. F. Hodgson, S. Dep. £3 3s.

JANUARY 31.

Johannesburg.—Bridgework.—Structural bridgework, for South African Railways and Harbours. Department of Overseas Trade, 35, Old Queen-st. S.W.1. (Ref. No. A.X.7227.)

FEBRUARY 12.

Belsover.—Tower.—New water tower in Langwith-rd., for U.D.C. T. B. Kenyon, clerk. Dep. £10 10s.

FEBRUARY 28.

Siam.—Superstructures.—Steel bridge superstructures, for Siamese State Railway. Department of Overseas Trade, 35, Old Queen-st., S.W.1. (Ref. A.X. 7098.)

ROAD, SEWERAGE, AND WATER WORKS

JANUARY 14.

Blean.—Construction.—Of about 510 yds. lin. of 9 in., and 80 yds. lin. of 6 in. stoneware pipe sewers, 8 manholes and other work appertaining thereto, in four new streets in Parish of Reculver, near Herne Bay, for R.D.C. F. A. Ward, S. and E.

Blean.—Sewer.—254 yds. lin. of 9 in. stoneware pipe sewer, four manholes, and other works appertaining thereto, at Albion-lane, Herne, near Herne Bay, for R.D.C. F. A. Ward, S. and E.

Bognor.—Improvements.—Widening and reconstruction of High-st., York-rd. to Wesleyan Chapel, including construction of reinforced concrete and mastic asphalte carriageway, together with improvements to forecourt boundary of walling and the widening of footpaths, etc., for U.D.C. J. Draper, S.

JANUARY 15.

Caernarvon.—Asphalting.—Playgrounds of Council schools, for Caernarvonshire E.C. W. L. Jones, County Architect, 14, Market-st., Caernarvon.

Southgate.—Diversion.—Of Pymmes-brook, Arnosgrove-park, for U.D.C. R. Phillips, S. Dep. £2.

JANUARY 16.

Birmingham.—For (1) Reconstruction of Gloversrd., Small Heath, between Golden Hillock-rd. and Whitmore-rd., including carriageway foundation of reinforced concrete and new Enderby granite kerb; and (2) widening and reconstruction of Clements-rd., Yardley, between Flavells-lane and Blakesley-rd., including carriageway of tarred slag macadam on a concrete foundation, new pennant kerb, and gravel and tarred limestone footways, for T.C. H. H. Humphries, City E. and S. Dep. £2.

Pontardawe.—Reconstruction.—Of (1) Abernantrd., Cwmgorse; and (2) Hodgson-rd., Godrergraig, for R.D.C. E. D. Jones, A.R.I.B.A., architect.

JANUARY 17.

Cardiff.—Making-up.—Of Highfield-rd., Murrayfield-rd., Groveland-rd., Coronation-lane, Caerphilly-lane, Dunsmuir-rd., Waterloo-gardens, Waterloo-Gardens-lane, Waun Fawr-rd., Parkfield-lane, Flint-lane, for T.C. City E.

Johannesburg.—Bridgework.—Structural bridgework, for South African Railways and Harbours, Department of Overseas Trade, 35, Old Queen-st., S.W.1. (Ref. No. A.X.7227.)

JANUARY 18.

Antrim.—Reconstruction.—In reinforced concrete of 7½ miles on various lengths of first-class roads A.6 and A.26, between Glengormley and Ballymena, for C.C. J. N. Beatty, C.S.

Ashborne.—Sewers.—Laying of sewers and construction of new road, for U.D.C. D. Powell, S.

JANUARY 19.

Long Ashton.—Main.—Extension of water main at Lower Claverham, for R.D.C. A. E. Hicks, clerk.

Nuneaton.—Drainage.—Construction of new outfall sewers, comprising approximately (a) 1,052 lin. yds. of concrete and brick-built egg-shaped sewer (4 ft. 2½ in. by 3 ft. 3 in. to 2 ft. 11 in. by 2 ft. 5 in.), average depth to invert 16 ft.; (b) 980 lin. yds. of 21 in. and 18 in. concrete and 18 in., 15 in. and 9 in. earthenware sewers; and (c) 120 lin. yds. of 24 in. dia. earthenware sewer, for T.C. R. C. Moon, B.E. and S. Dep. £2 2s

JANUARY 21.

Bexleyheath.—Making-up.—Of Edmund-rd. and Coton-rd., Welling, for U.D.C. W. T. Howse, S. Dep. £1 1s.

★Eastbourne.—Sewers.—(1) Proposed new sewers, Kingston-rd.; (2) new surface water sewer, Lottbridge-rd., for the Highways Committee, Eastbourne B.C. Borough Engineer's Office, Town Hall, Eastbourne.

Ilford.—Making-up.—Of Cranbrook-rise, Fairholme-rd., Gordon-rd. (part), Pavilion-rd. (part), St. Andrew's-rd., St. Edmund's-rd., St. Helen's-rd., Vaughan-gardens, and Woodstock-gardens, for T.C. B.E. and S. Dep. £2 2s. each.

Poole.—Making-up.—Also surface-water draining Grove-rd., for T.C. E. J. Goodacre, B.E. Dep. £1 1s.

Shardlow.—Sewerage.—Sewer in Duffield-rd., Little Eaton, for R.D.C. Elliott & Brown, chartered civil engineers, Burton-buildings, Parliament-st., Nottingham. Dep. £3 3s.

JANUARY 22.

London.—Reinforced Concrete Roadway, etc.—To West Loading Yard, Mount Pleasant Letter Office, E.C., for the Commissioners, H.M.O.W. Contracts Branch, King Charles-st., S.W.1. Dep. £1 1s.

Luton.—Sewerage.—Laying of 5½ miles of stoneware pipe foul water sewers in Lee Ward, for T.C. J. W. Tomlinson, B.E. and S. Dep. £1 1s.

Marsden.—Reconstruction.—Subsoil drainage scheme at Standedge, on Wakefield and Austerland main road, for U.D.C. J. Smith, E. and S. Dep. £2 2s.

Southall-Norwood.—Roads.—Roads and sewers in Greenford-av. extension, East-av., and Shackleton-rd. extension, for U.D.C. J. B. Thomson, Housing Architect. Dep. £2 2s.

JANUARY 23.

Ayr.—Water Supply.—Excavation and refilling of trenches for and the laying and jointing of about 3,000 lin. yds. of 24 in. diameter and about 2,000 lin. yds. of 21 in. diameter steel pipes, between Loch Finlas and the lower end of Loch Doon, and other relative work, for T.C. Warren & Stuart, engineers, 94, Hope-st., Glasgow. Dep. £2 2s.

Ayr.—Water Supply.—8,800 lin. ft. of 24 in. diameter and about 5,800 lin. ft. of 21 in. diameter bitumen lined steel pipes, together with bitumen lined steel specials and cast-iron specials, for T.C. Warren & Stuart, engineers, 94, Hope-st., Glasgow. Dep. £2 2s.

★London.—Asphalte Paving.—Surfacing the garage approach at St. Andrew's Hospital, Devons-rd., Bow, E. (approx. 500 yards), for the Poplar Board of Guardians. Harley Heckford, M.Inst.E., B.S., Council Offices, High-st., Poplar, E.14. Dep. £1 1s.

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JANUARY 24.

Teddington.—Making-up.—Of Cambridge-crescent, for U.D.C. E. Bostock, S. Dep. £2 2s.

JANUARY 28.

Coulsdon and Purley.—Improvements.—Sewering of section of Old Lodge-lane, Purley, for U.D.C. G. A. Ballard, S. Dep. £1 1s.

Coulsdon and Purley.—Sewering.—Of portion of main Brighton-rd., between Purley Tram terminus and the Red Lion Hotel, Coulsdon, for U.D.C G. A. Ballard, S. Dep. £5 5s.

Coulsdon and Purley.—Making-up.—Of Norman av., Sanderstead, for U.D.C. G. A. Ballard, S. Dep. £1 1s.

Exmouth.—Sewerage.—2,100 yds. of 12 in. and 9 in. stoneware pipe sewers, with manholes and other contingent works, in Littleham, for U.D.C. S. Hutton, E. and S. Dep. £1 1s.

JANUARY 30.

London.—Sewer.—Construction of about 340 ft. of 4 ft. by 2 ft. 8 in. brick sewer, mostly in tunnel, and contingent works beneath Butler-st. and Moor-lane, for Corporation. City Engineer, Portland House, Basinghall-st., E.C.2. Dep. £2 2s.

Auction Sales, Tenders, etc.

JANUARY.

Surrey.—John Sulley, F.A.I., by order of the trustee in bankruptcy re T. A. Edwards, in bankruptcy, at Anchor Wharf, Windmill-lane, Long Ditton, Surrey, new and well-assorted stock of a general builder's merchant. Auctioneer, 46, Cannon-st., London, E.C.4.

JANUARY 16.

★London.—Messrs. Joseph Hibbard & Sons will sell, without reserve. By order of Messrs. E. Gray, Ltd., and the East London Joinery Works, Ltd. (owing to opening of new premises at Ilford), upon the premises, 451 and 453, Katherine-rd., Forest Gate, E.7, saw mill plant and machinery, timber and joinery, builders' merchants' stock, etc. Auctioneers, 15, Newington-green, Islington, N.16.

JANUARY 22.

★London.—Joseph Hibbard & Sons will sell, by order of Mr. C. Blumson, owing to the premises being pulled down, upon the premises, No. 1, Wilmer-gardens, Hoxton-street, stock of imported hardwoods. Auctioneers, 15, Newington-green, Islington, N.16.

JANUARY 23, and following day.

★Wokingham.—Charles R. Davis & Co. will sell, under a Deed of Assignment, re H. Dyke, trading as J. B. Seward and Co., by order of the Trustee, at the yard and workshops, "Crown Works," Langborough-rd., Wokingham, Berks, stock-in-trade, plant and machinery of a builder and contractor. Auctioneers, 285, Borough High-st., London, S.E.1, and at Croydon.

Public Appointments

JANUARY 14.

Battersea.—Works Foreman required to act under the Borough Surveyor, by the Battersea B.C. Edwin Austin, Town Clerk, Town Hall, Battersea, S.W.11.

Cape Province.—Lecturer in Building Trades, Grade I., required at the East London Technical College, Cape Province. Secretary, Office of the High Commissioner for the Union of South Africa, South Africa House, Trafalgar Square, W.C.2.

Fulham.—Assistant Works Master required by the Guardians of the Parish of Fulham, at the London Industrial Colony, Sutton, Surrey. L. Prichard, Clerk, Guardians' Offices, 129, Fulham Palace Road, W.6.

JANUARY 15.

Bradford.—Assistant Lecturer in the Department of Civil Engineering, Architecture and Building required by the E.C. at the Technical College, Bradford. Dir. of Edu., Town Hall, Bradford.

JANUARY 18.

Chester.—Clerk of Works required to supervise erection of Bebington Secondary School (appointment approximately two years), by the Chester C.C. F. Anstead Browne, F.R.I.B.A., C.A., Newgate-st., Chester.

JANUARY 22.

Durham.—Architectural Assistant required by the Durham C.C. Dir. of Edu., Shire Hall, Durham.

JANUARY 23.

Nelson.—General Foreman and Clerk of Works (joint position) required by the T.C., for the erection of an open-air school. Town Clerk, Town Hall, Nelson.

★Southport.—Temporary Architectural Assistant required by the Southport B.C. A. E. Jackson, M.Inst.C.E., Town Hall, Southport.

APRIL 3, 4, 5.

London.—London Building Act, 1894.—District Surveyors at a London Centre, an examination of persons presenting themselves for the purpose of being examined for duties of District Surveyors. Clerk of the Council, the County Hall, Westminster Bridge, S.E.1.

NO DATE.

★Gold Coast.—Foreman of Works required by the Government of the Gold Coast, for the Public Works Department, for a tour of 18 months' service, with possible extension. Crown Agents for the Colonies, 4, Millbank, London, S.W.1., quoting M.632.

Straits Settlements.—Assistant required for the Architect's Department of the Public Works Department in the Straits Settlements for three years' service with prospect of permanency. Apply at once by letter, Crown Agents for the Colonies, 4, Millbank, S.W.1, quoting M/1155.

PROPOSED NEW BUILDINGS & OTHER WORKS*

In these lists care is taken to ensure the accuracy of the information given, but it may occasionally happen that, owing to building owners taking the responsibility of commencing work before plans are finally approved by the local authorities, "proposed" works at the time of publication have been actually commenced. Abbreviations: T.C. for Town Council; U.D.C. for Urban District Council; R.D.C. for Rural District Council; E.C. for Education Committee; B.G. for Board of Guardians, B.C. for Borough Council; P.C. for Parish Council; M.H. for Ministry of Health; M.T. for Ministry of Transport; C.B. for County Borough; B. of E. for Board of Education, M.A.B. for Metropolitan Asylums Board; and M.W.B. for Metropolitan Water Board; Borough Surveyor, B.S.; Borough Engineer, B.E.; District Surveyor, D.S.; Clerk, C.; Town Clerk, T.C.; County Engineer, C.E.; County Surveyor, C.S.; County Architect, C.A.; Surveyor, S.; Engineer, E.; Borough Architect, B.A.; Architect A.

Batley.—Tenders are to be invited for building of new Wesleyan Church at Alder-grove, estimated at £10,000. New building provides for school with hall to seat 450, and 13 small rooms, together with a church, which will also seat 450.

Barnsley.—Barclays Bank, Ltd., proposing conversion of premises at Queen's-st., for branch bank Plans by N. A. Whitham, architect, 25, Regent-st., Barnsley.

Barrow-on-Soar.—R.D.C. acquired more land for housing in Mountsorrel.—Council decided to sanction erection of 20 more houses at Mountsorrel and Rothley.

Beddington and Waddington.—U.D.C. passed plans:—9 houses, in two blocks, West-av., for T. Wise; 14, shop dwellings in one block, Stafford-rd., for A. Moss; 16 semi-detached houses, Bridle-path, for McColloch and Kingslake; 3 detached houses, Beddington-gardens, for S. Foreman; 2 houses, Bandon-rise, for J. Midmer; 10 houses, Godalming-av., for G. S. Cook and Son.

Bilston.—U.D.C. passed plans for proposed factory, Ettingshall-rd., for T Holcroft & Sons, Ltd.

Birmingham.—T.C. recommend that Finance Committee be instructed to apply to Electricity Commissioners for sanction to borrow £6,750 to complete purchase of property in Grosvenor-st. West, required for purposes of a sub-station.—E.C. recommend that, subject to approval of B. of E. and M.H., action of Committee in connection with proposed purchase of site for a secondary school for boys at Erdington, be approved.—Subject to approval of B. of E. and M.H., Council is to provide £400 required to defray cost of remodelling latrines at Vicarage-rd. Council school.—Council are to purchase house in Summerfield-crescent, for £850.

Blackpool.—Rev. Canon Vaughan proposing to erect church in Link-rd. Plans by Pugin & Pugin, architects, 15, Moorfields, Liverpool.

Blackpool.—C.B. resolved that plan submitted by B.S. showing lift tower, lavatories and shelter proposed to be erected on cliffs at North Shore, opposite boating pool, be approved.—Application is to be made to M.H. for sanction to borrowing of £9,801 for extension of Waterloo Council School.—Director of Public Cleansing is to proceed with work of providing conveniences and shelter in Waterloo-rd.—Council resolved that design and estimate of cost now submitted of clock tower and tram shelter proposed to be erected at Gynn-sq. be referred to the Tramways and Electricity Committee for their observations.—Estates and Housing Committee are to erect six houses on land on west side of refuse disposal plant at Bispham for occupation by workmen employed at such works.—Application been submitted from Tramways department for approval to site near Stanley Park entrance for a motorbus passenger shelter.—Plans passed: 8 houses, Somerset-av., Staunton & Co., Ltd.: 6 houses, Somerset-av., Staunton & Co., Ltd.; 8 houses, Warbreck-av., J. Fielding & Sons, Ltd.; 13 houses, Dorset-st., W. Butler & Co.; 9 houses, Dalewood-av., Mercer & Radcliffe; 2 houses, South Park-drive, Watson & Myerscough; 5 houses, St. George's-rd., J. Midgley; 15 houses, Mather-st., R. B. Mather; 3 houses, Oregon-av., R. Hollis; 3 houses, Westmorland-av., Fletcher & Murdock; motor showroom, Park-rd., S. H. Thomas; extensions, Park-rd., S. H. Thomas; additions, Charnley-rd., Blackpool Co-operative Society, Ltd.

Bolton.—W. Johnson & Sons, architects, 27, Oldham-rd., Miles Platting, Manchester, preparing scheme for structural alterations to Swan Hotel, Bradshawgate for Wilson's Brewery, Ltd., Monsall-rd. Brewery, Manchester.

Bournemouth.—T.C. passed plans: 2 pair of houses, Strouden-rd., Martin & Co.; alterations, 126 and 128, Poole-rd., E. Thorne; lock-up garages and stockroom over the Grand Hotel, Firvale-rd., Grand Hotels Co., Ltd.; 3 houses, The Avenue, Redhill Park estate, H. Masters; 5 shops and 10 flats, Cranleigh-rd., A. H. Parks.

Bridlington.—T.C. made application to M.H. to borrow £50,000 for construction of a new section of sea wall on north side of town, from Sands-lane to Limekiln-lane.

Canterbury.—T.C. passed plans:—Alterations, 14, St. John's-lane, for Christian Science Society; deposited by Amos & Dawton; extensions to vestry, etc., St. Martin's Church, for Rev J. T. Hales; deposited by Forsyth & Maule, architects; showroom, 41, Palace-st., for Dean & Chapter; deposited by W. S. Willan.

Chapel-en-le-Frith.—Additions and alterations to be made to Wesleyan Day Schools to meet requirements of B.E. Plans by Thos. Partington, architect, Market-st.

Chelmsford.—T.C. decided that B.E. should prepare estimate of cost of erection of approximately 25 garages on Boarded Barns estate.—R.D.C. recommend that further cottages be erected in following parishes: Great Baddow, Galleywood 4, Ingatestone 20, Great Waltham 6, Writtle, including Highwood, 40; and that clerk be directed to apply to M.H. for sanction.

Cheltenham.—Plans for new nursing home, at £7,000, been sent to M.H.: L. W. Barnard & Partners, architects.

Chorley.—Rookwood site, on Preston-rd., been acquired for new hospital.

Colchester.—T.C. are inviting tenders for the erection of further 58 houses at Defoe-crescent, and have applied to M.H. for sanction to borrow £26,500.

Cookham.—Subject to approval of district valuer, R.D.C. accepted offer of N. J. Parsons to sell a portion of land at Cookham Rise as site for further cottages.

Coulsdon and Purley.—U.D.C. resolved that Surveyor be instructed to submit plans for pavilion at Higher-drive Recreation ground, at £500.—Plans passed: H. Thomas, 6 semi-detached houses, Whytecliffe-rd., Purley; H. Thomas, Girl Guides' hall, adjoining Christ Church, between Whyteclieffe-rd. and Brighton-rd., Purley; E. O'Sullivan, Ltd., 4 detached and 2 semi-detached houses, Whyteleafe estate.

Dagenham.—U.D.C. passed plans: 10 shops and dwellings at junction of Wood-lane and Hobart-rd., Becontree, for Marcus Estate, Ltd.; 3 houses, Tenby-rd., Chadwell Heath, for H. Burridge.

Dartford. — M.A.B. approved provision at Southern Hospital, at £390, subject to sanction of M.H., of cold storage in accordance with scheme prepared by engineer-in-chief.

Derry.—Corporation convened to consider propriety of promotion by Council in ensuing session of Parliament of Northern Ireland of bill authorising construction of a new bridge across the Foyle, removal of existing Carlisle Bridge, and for other purposes.

Doncaster.—Walker & Thompson, architects, preparing plans of school in Tickhill-rd. for Corporation.—J. Blyth Richardson is architect for preparation of plans for six additional classrooms at Wheatley Schools.—E.C. propose to carry out extension scheme at Technical College, for which plans are in course of preparation.—Housing Surveyor is instructed to prepare plans for new houses and shops at Intake housing estate.

Ealing.—T.C. passed plans: Church-rd., Northolt, shop (off-licence), for Charrington & Co., Ltd. (architect, Nowell Parr, 42, Cranley-gardens, S.W.7); Castlebar-park, 2 houses, for Tyler & Tyler, 51, The Mall, W.5; Audley-rd., 3 houses (25, 31 and 49) for Haymills, Ltd.; Kent-gardens, 7 garages, for J. A. Danks (architect, S. H. West, The Mall, W.5); Beechmount-av., alterations and additions (cooling chamber and electric oven) (73, 75, 77, 79, 81, 83, 85, 87, 76, 78, 80, 82, 84 and 86) Great Western Land Co. Elthorne Heights estate, W.7; Abbey-rd., Park Royal, compressor house, for Hall, Lewis & Co., Ltd., Abbey-rd., Park Royal, N.W.10; The Common, alterations at 20, for R. Hallward (W. Walkerdine, Ltd., builders, 115a, Walmer-rd., North Kensington, W.10); Uxbridge-rd., alterations and additions at 142, for F. Abernethie (builder, L. N. Wiles, 9, Cheringtonrd., Hanwell); Queen Anne's-gardens, pavilion, for F. Byford (architect, S. H. West); Wood End-lane, alterations at "The Elms," conversion into flats, for Mr. Lawrence (builder, G. Bond, 87, Deans-rd, W.7); Cantley-rd., Hanwell, 6 houses, for F. P. Hurst (architect, H. A. Steel, 289, Northfield-av., W.13); Hanger-hill, 2 houses for St. Augustine's Priory (architects, Peacock & Bewlay, 83, Colmore-row, Birmingham); Ruislip-rd., Greenford, 11 houses, for G. Wimpey & Co. (H. S. Bostock, Broadway-chambers, Southall); Audley-rd., 10 houses (27, 29, 33, 35, 37, 39, 41, 43, 45 and 47), for Haymills, Ltd., 1, Grand Parade, Forty-lane, Wembley Park; Greenford-av., Hanwell, 2 shops (off-licence), for Fuller, Smith & Turner (surveyors, Daniel Watney & Sons, 4a, Frederick's-place, Old Jewry, E.C.2); Queen Anne's gardens, 6 houses (1, 19, 21, 35, 2 and 24), for F. Byford (architect, S. H. West); Gunnersbury-av., 2 houses (85 and 87), for A. C. Kerven (architects, Newborn & Smith, 6, New-square, Lincoln's Inn, W.C.2); Gunnersbury-av., 6 houses, for Wm. Atkinson, 15, Balfour-rd., Acton, W.3.

Elston.—Housing scheme involving construction of crescent-shaped road and 120 houses is to be carried out on Ampthill-rd. The owner is Mr. A. Taylor, of Banbury.

Epsom.—M.A.B. approved carrying out of certain improvements to boiler house at The Downs Hospital for Children at cost estimated by the engineer-in-chief at £105.—Approval been given in principle to provision of new nurses' home at The Downs Hospital for Children, together with certain other incidental work.

Halifax.—Site been approved for lavatories at Bermerside Schools.

Harrogate.—M.H. inquiry been held into application of Corporation to borrow £10,000 for shelter and bandstand in Valley Gardens.

Hatfield.—Parish Council are considering scheme for mission hall upon a site at Dunscroft.

Havant.—R.D.C. passed plans:—J. C. Juniper, 8 houses, Central-rd., 3 houses Station-rd., 2 houses Holmefield-rd., Drayton; F. W. Feben, 2 houses Mill-rd., Waterlooville.

Hazel Grove and Bramhall.—U.D.C. passed plans:—16 houses, Earl-rd., and 3 houses, Neville-rd., Bramhall, for C. W. Oakes; 6 houses, Chatsworth-rd., off Macclesfield-rd., Hazel Grove, for J. Briggs and Co.

High Wycombe.—T.C. passed plans:—8 houses, Mile End-rd., for J. Harris; 2 retail shops, Frogmoor, for F. W. George; 10 houses, Gallows-lane, for P. W. Lowe.

Hindley.—Industrial Co-operative Society, Ltd., are proposing to reconstruct general office at 11, King-st.

Holbeck.—Necessary permission been granted to Thos. Palmer to erect a film store and two dressing rooms at cinema studio at 36, Victoria-rd., and at Hill's-yard.

Hounslow.—Hounslow West Station on District Railway is to be rebuilt.

Huddersfield.—Abbey & Hanson, architects, Clogh Hall-st., prepared plans for premises in King-st. and Market-walk for A. Kaye.

Ilford.—T.C. passed plans: G. Hamblin Fox, alterations and additions, 754-756, Green-lane; J. Aldridge (Suburban Developments, Ltd.), 88 houses, 176-244, Perth-rd., 1-71, Middleton-gardens, 18-70, Middleton-gardens; W. Stewart, alterations and additions, "Royal Oak," P.H., Green-lane; A. P. Griggs, 10 houses, 17-35, Chichester-gardens; A. Smith, 8 lock-up garages, Hedgeman's-gardens; A. Smith, 32 houses and 12 garages, 1-31 and 2-32, Collinwood-gardens; P. T. Sawkins, 13 houses, 66-90, Redbridge-lane; Haines & Warwick, Ltd., 6 houses, 386-396, Ley-st.; B. Bailey & Co., 3 shops, Cranbrook-rd.; Freeman, Hardy & Willis, alterations, 193, High-rd.; T. Anders, 25 houses and garages, 1-49, Grangeway-gardens; A. E. Wright, 17 houses, 67-99, Redbridge-lane; T. B. Goodwin, 27 houses, 1-27 and 2-26, Clifton-rd., 24 houses, 1-23 and 2-24, Malford-gardens, 23 houses, 1-23 and 2-22, Lancing-rd., 39 houses, 1-21 and 2-56, Lynn-rd.; Whinney, Son & Austen Hall, alterations, 126, High-rd.; E. Meredith, addition, 532, High-rd., Goodmayes; A. P. Griggs, 6 houses and garages, 32-42, Exeter-gardens; J. W. Moore & Son, 5 houses, 78-86, Levett-gardens; Ullyett & Co., revised block plan, of 21-25, Hamilton-av. and 1 house, 27, Hamilton-av.; F. Smith for R. Cramp & Son, factory, New North-rd.; J. Aldridge, 2 shops and dwellings, 243-5, Cranbrook-rd.; F. S. Barnard, 4 lock-up garages rear of 52, Coventry-rd.; A. P. Griggs, 4 houses, 1, Chelmsford-gardens, and 2-6, Chichester-gardens; E. Meredith, shop and restaurant, Grove-rd.; F. Smith, for A. Burridge & Co., 87 houses, Chadwell Heath-lane, Herbert-rd., Charles-rd., Clarissa-rd., Arthur-rd., Claude-rd., and Edgar-rd.; C. J. Dawson, Son & Allardyce, additional story, 197-203, High-rd.; C. J. Dawson, Son & Allardyce, offices for Ilford, Ltd., Roden-st.; W. Fallows, 4 houses, Ashurst-drive.

Leeds.—Tenders being invited for new distributing centre for W. Jacobs, Ltd. Architects, G. F. Bowman & Son, Park-row. Tenders also being invited for warehouse at Garnett-rd. for Saml. Driver, Ltd. R. L. Brown, architect.

Leeds.—T.C. passed plans: T. & W. Broderick, 4 semi-detached houses, Vesper-walk, Kirkstall; A. Cryer, 4 houses, Dawlish-st., York-rd.; J. W. Broadbent, 6 semi-detached houses, Stonegate-rd., Meanwood; Frank Rawnsley, 6 semi-detached houses, Leeds and Bradford-rd. and Bramstan-gardens, Bramley; W. Jowitt, 1 detached and 12 semi-detached houses, York-rd. and Harrison-crescent; Gledhill Fothergill, 2 semi-detached houses, Butt-lane, Farnley; B. Whitaker, 20 semi-detached houses, Carrholm-view, Chapel Allerton; Thomas & Hedley Johnson, 4 semi-detached houses, Woodside-view and Bankfield-rd., Kirkstall.

Leyton.—T.C. passed plans: South Essex Property Co., Ltd., 7 houses, Oliver-rd.; J. E. Nelson, 4 garages, Sandringham-rd.

Liverpool.—T.C. recommend £978 in respect of erection of boundary wall and iron railings at Dovedale-rd., Council school to enclose original site and recently acquired land abutting upon same.—Subject to approval of M.H., the Land Steward and Surveyor is to proceed with erection of proposed Rabbitry building at Fazakerley Sanatorium, at £350.—(a) £613 is recommended in respect of adaptation and equipment of Palmerston-st. premises for purposes of a practical instruction centre.—Also £775 in respect of erection and furnishing of Newhall-lane school portable manual instruction centre.

Lofthouse.—Rothwell U.D.C. are to erect additional 8 houses.

London (Abbey Wood).—M.A.B. are to provide temporary building as additional schoolroom at Goldie Leigh Homes at £365.

London (Acton).—T.C. passed plans:—G. P. Pratt, architect, 174, High-st., Acton, W.3, factory,

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* See also our List of Contracts, Competitions, etc.

12, Chase estate, for Allnatt, Park Royal-rd.; J. Atherton & Co., builders, Perryn-rd., W.3, 16 houses with garage to each, Friars Place-lane; G. P. Pratt, architect, 174, High-st., Acton, W.3, factory, 14, Chase estate, for Allnatt, Park Royal-rd.; J. A. Perriss, builder, 26, Willcott-rd., W.3, 14 houses, Old Oak-rd.; S. G. Wilson, architect, 43, Tavistock-sq., W.C.1, 10 houses, St. Andrews-rd., 38 houses, Sunningdale-av., for C. Peppiatt; P. W. Williams, architect, 242, High-st., Acton, W.3, revised plan 4 flats, Mrs. Byrne, Birkbeck-av.; P. W. Williams, architect, 242, High-st., Acton, W.3, garage, offices and showrooms, corner West Lodge-av., Uxbridge-rd.; G. P. Pratt, architect, 174, High-st., Acton, W.3, boiler house to factory, 8, Chase estate, Allnatt, Park Royal-rd.; G. P. Pratt, architect, 174, High-st., Acton, W.3, revised block plan 9, Block, Chase estate, Allnatt, Park Royal-rd.; R. H. Radburn, architect, 33a, Broadway-chambers, Acton, W.3, addition to film repair building, Kine Laboratories, Ltd., School-rd.; Fairweather & Ranger, builders, 18, Brownlow-st., Holborn, extension to factory, Telegraph Condenser Co., Wales Farm-rd.; J. A. Perriss, builder, 26, Willcott-rd., Acton, W.3, 14 garages, Lexden-rd.

London (Brixton).—M.A.B. received M.H. sanction to tender of £455 for conversion of nurses' cubicles into bedrooms at South-Western Hospital.

London (Camberwell).—B.C. passed plans: W. F. Blake, erection of lock-up garages at rear of 120/122, Camberwell-grove; E. W. Wallis, lock-up garages at rear of 113/115, Denmark-hill.

London (Lewisham).—A £3,000 shelter is to be built for lawn-tennis players in Ladywell park.

London (New Cross).—M.H. sanction revised scheme for improvement of South-Eastern Ambulance Station, for M.A.B.

London (Tooting).—M.H. sanctioned proposals for provision of additional accommodation for nurses at Fountain Mental Hospital.—M.H. sanctioned also £789 for erection of laboratory at Tooting Bec Hospital, for M.A.B.

London (Woolwich).—B.C. recommend that Council enter into housing accommodation for tenants of 19 hutments required to be demolished for construction of South Circular Arterial-rd.—Application is to be made to L.C.C. for sanction to borrow £2,515 for erection of 5 houses on Council Housing estate at Eltham.—Plans passed: W. E. Wright, 66, Eltham-hill, Eltham, 4 shops with domestic quarters, Avery Hill-rd., Eltham; F. T. Dear, 34, Palace Court, W.2, on behalf of United Dairies, Ltd., covered van shed, stable buildings, sanitary conveniences and mess room, Westmount-rd., Eltham; J. Laing & Son, Ltd., Mill Hill, N.W.7, 7 shops with flats, Well Hall-rd., Eltham; G. T. Harman, 165, Rushey-green, Catford, S.E.6, on behalf of James Watt, 7 houses and garages, West-park and Court-rd., Eltham.

Long Reach.—M.A.B. received M.H. approval consenting to the appropriation of certain sums amounting to total of £21,510 towards defraying cost of reconstruction of Long Reach Hospital.

Lowestoft.—M.H. sanctioned tender of £3,923 14s. 2d. for erection of new staff building at St. Margaret's Hospital and sanctioning expenditure of £4,204.

Lymm.—Scheme for school at Broom Edge being considered.

Maidstone.—T.C. passed plans for 8 houses in Ashford-rd., Bearsted, for E. J. Sheppard.

Manchester.—Tootal, Broadhurst, Lee & Co., Ltd., spinners and manufacturers, Oxford-st., proposing to make extensions to mills at Ten Acres-lane, Newton Heath. Plans by J. H. Sellers, 78, King-st.

Manchester.—R. Rostron, 47, Brighton-grove, Rusholme, had plans approved for hostel in Lower Park-rd., Victoria-park, at £5,000.

Moira.—R.D.C. sanctioned erection of 20 labourers' cottages.

Newcastle-on-Tyne.—Roman Catholic Community proposing to erect church on Stamfordham-rd. Architects, Stienlet & Maxwell, L. & F.R.I.B.A., 5, Saville-chambers, Saville-st.

Northallerton.—New post office will be erected on site of present Bellazone House in centre of High-street.

Northampton.—C.B. passed plans for 4 houses, Wycliffe-rd., W. J. Richardson; engineering works extension, Balmoral-rd., Advance Motor Manufacturing Co., Ltd.

Nottingham.—C. A. Eddison, "Killinagh," Berry Hill-lane, Nottingham-rd., Mansfield, is architect for convent at Bulwell, for Society of Poor Clares.

Paignton.—U.D.C. sanctioned plans for 13 houses on destructor site, York-rd., for Council.

Penrith.—U.D.C. is to apply for sanction to loan £21,503 for 58 houses on West-lane site.

Poynton.—E.C. propose to erect a central school on Clumber-rd.

Rawmarsh.—U.D.C. passed plans for lay-out of Ryecroft housing estate and decided that second road into South-st. be deleted from scheme. Plans were approved, and surveyor instructed to have the barns taken down on land purchased by Council, with a view to building being commenced as early as possible.

Rotherham.—C.B. approved plans by B.E. for sports pavilion, estimated to cost approximately £5,000. Tenders are to be invited.—T.C. is to apply for sanction of M.H. to borrowing of £10,000, being estimated cost of erection of sports pavilion, and the carrying out of other works in connection with Herringthorpe Playing Fields.—B.E. submitted plan of residence for Parks Superintendent, as approved by Parks Committee, showing proposed site at junction of Badsley and Boswell-st., and it was recommended that same be approved.—It was also decided to obtain sanction for approximately 300 additional houses on Herringthorpe estate, at £120,000.

Rothwell.—U.D.C. propose to erect additional 17 houses at Rothwell-Haigh and 9 at Carlton.

Rugby.—U.D.C. passed plans:—4 garages, plot 30 Caldecott-st., Misses Cowlishaw and Chettlesburgh; mineral water factory, Burton & Co.

Salford.—C.B. recommend E.C. to borrow £6,372 to cover cost of purchase, for use in connection with development of Municipal Secondary School for Girls at Summer Hill and provision of playing fields, of certain land and buildings forming part of the Chaseley estate, Pendleton.—Health Committee recommend Council to make application to M.H. for sanction to borrowing of £30,100 for erection of 76 houses on Gerald-rd. site, Pendleton.

Scarborough.—F. Tugwell, architect, for a scheme of reconstruction at Pavilion Theatre. Tenders being invited.

Scarborough.—Schemes are under consideration for Corporation bakery buildings adjoining Corner Cafe, or alternatively, the construction of a bakery and stores at Corporation Depot, Dean-rd. It is proposed to construct single span bridge with forty-foot roadway in lieu of present Mere-lane Crossing.

Send (Surrey).—P.C. are making application to C.C. and M.H. for consent to borrowing by Parish Council of £450 for purpose of erecting fire station.

Sheffield.—T.C. passed plans: 4 houses and garages, Hoober-rd., for G. M. Taylor; 5 houses, Bellhagg-rd., for Aloysius O'Neill; 4 houses, Endowood-rd., for J. Bailey; 3 houses, Walkley-st., for Mrs. A. E. Ellaway; 4 houses, Arran-st., for B. Hawley; 4 houses and alterations, High Storrs-rd., for T. Pye; 12 houses, Renshaw-rd., for J. Ramsden.

Sittingbourne.—An estate is to be laid out for residential purposes to plans of H. Goater, architect, Trowbridge, Wilts.

Skelmersdale.—Rev. Murphy, of St. Richard's R.C. Church, is proposing to erect parochial hall opposite schools in Liverpool-rd.

Skipton.—Plans in course of preparation for new district hospital.

Slough.—A new secondary school for boys to be built by Buckinghamshire E.C. is to be called Slough Grammar School.

Slough.—U.D.C. passed plans: 6 houses in Lascelles-rd., for E. H. Stiles; pair of houses in Upton-rd., for S. Roe; alterations and additions to "Dolphin" hotel, for Ashby's Staines Brewery.

Smethwick.—C.B. received M.H. sanction to borrowing of £10,815 in connection with improvement scheme near Smethwick Hall. It is also recommended that application be made to M.H. for sanction to borrowing of £12,984 in connection with lay-out of Chapelry estate, including alterations to brook course.—General Purposes Committee approved plans of proposed new clinic to be erected on The Firs estate, together with approval of estimate of £12,022.—C.B. passed plans: 12 houses at Woodlands-rd., for F. V. Arter; 4 houses at Woodlands-rd., for J. Reece; store shed at 410, Bearwood-rd., for Wrensons; extension to Gospel Hall, Brasshouse-lane.

Southend-on-Sea.—C.B. passed plans:—4 houses, Gainsborough-drive, Wm. Bunday; alterations and additions, 19, Western-rd., Mrs. Dod; 4 houses and 4 garages, Birchwood-drive, H. A. Mowle; 9 houses, Inverness-av., F. W. Taylor; 2 houses and shops, London-rd., G. Spurgeon; 3 houses, Lonsdale-rd., A. S. Chalkley; 4 garages, Sandringham-rd., Mrs. M. G. de Steese; 4 houses, Tankerville-drive, T. E. Gill; additions, "Nelson Hotel," North-rd., Prittlewell, F. W. Mack; re-building premises, 56, 58 and 60 High-st., Southend, Marks & Spencer, Ltd.

Southgate.—U.D.C. passed plans: Edmondsons, Ltd, amended plan of 7 shops, 31 garages and 9 dwelling-houses, Green-lanes and Bridge-gate, Red Ridge estate; F. F. Tomlin, amended plan of 16 houses and garages, Arnos-grove; G. W. S. Ingram, 6 houses and 4 garages, Oaklands.

South Mimms.—Inquiry been held into application to M.H. by R.D.C. for issue of a provisional order to dissolve Special Drainage District now forming part of the parish of South Mimms, and merge it with the whole of district; and application of Council for sanction to borrow £39,500 for works of sewerage and sewage disposal.

St. Albans.—R.D.C. decided to apply to M.H. for sanction to erection of further 18 houses at London Colney

Stratton and Bude.—Schemes, estimated to cost over £20,000, been adopted, pending sanction of Ministry, by U.D.C. Schemes are road widening work along the Coast-rd., Poughill-rd. as far as Well Farm, Poundfield-rd. and Howard Corner; a new service reservoir at Leigh; new filter beds at Vealand; and a new 8-inch and 6-inch cast-iron pipe line to duplicate the existing arrangements.

Sutton Coldfield.—T.C. passed plans:—Pair of houses, Gate-lane, for C. P. Trafford; 3 houses, Gate-lane, for C. P. Trafford; 3 houses, Livermead-rd., for A. P. Johnson.

Tavistock.—R.D.C. agreed to accept offer of three-quarters of an acre at Buckland, and when site been secured they recommend that tenders be invited for erection of 6 houses.

Thornbury.—R.D.C. decided to proceed with a scheme for building 54 houses, as follows:—Thornbury, 12; Olveston, 6; Redwick, 4; Almondsbury, 8; Alveston, 6; Henbury, 8; Hinton, 6; and Hamfallow, 4.

Uxbridge.—M.H. sanctioned loan for 30 new Harefield houses, for R.D.C.

Walthamstow.—U.D.C. passed plans: Addition, Hoe-st. and Orford-rd., London Co-operative Society; 8 garages, Bull's Farm, J. Egginton; 12 houses and 2 garages, Worcester and Gloucester-rds., A. Peachey & Co.; amended plan 52 garages, Billet-rd., Law Land Building Department.

Warrington.—R.S. submitted plan and elevation of scheme to provide necessary additional accommodation at library, at £3,750.—Manager of Longford Depot been authorised to construct wall at right side of destructor shed.

Warrington.—Funds being raised by members of Elmwood Congregational Church for erection of new edifice—Wright & Hamlyn, L.R.I.B.A., Patten-chambers, Winmarleigh-st., are architects for new elementary school at Latchford.—Funds being raised by officials of St. John's Presbyterian Church, Wilderspool Causeway, for new church hall building and Sunday School additions, estimated to cost £4,500. Morter & Dobie, L. & F.R.I.B.A., 36, The Temple, Liverpool, are architects.

West Bromwich.—T.C. are seeking sanction to erect two blocks of experimental type houses, at £250 per house.

West Lancashire.—R.D.C. passed plans:—House and garage, Gravel-lane, Banks, Lancashire Touring Caravan Co.; pair bungalows, New-lane, Banks, C. W. Marten & Co.; hall, Aughton Women's Institute off Town Green-lane.

West Melton (Yorks).—Members of Brampton Parish Church, Vicar, Reverend C. L. Suggitt, raising funds for erection of new church hall, at £2,000.

Wigan.—Greenall, Whitley & Co., brewers, St. Helen's, proposing alterations to British Queen Hotel.—Wigan and District Equitable Co-operative Society, Ltd., Standishgate, proposing to carry out restoration of central premises.

Willesden.—U.D.C. is proposing to build flats in South Kilburn, N.W.

Winchmore Hill.—M.A.B. approved £120 for improvements in electric lighting in wards of pavilions 7a and 7b at Northern Hospital.—M.H. sanction necessary expenditure for provision of engineer's store and potting shed at Northern Hospital, and suitable office for resident engineer.

Wolverhampton.—W. Butler & Co., Ltd., Springfield Brewery, proposing to erect licensed premises on site of Giffards Arms Hotel, Victoria-st. Plans by J. H. Swann, F.R.I.B.A., 33, Paradise-st., Birmingham.

Wood Green.—U.D.C. passed plans:—High-rd., additions, G. Spencer & Co. (for Temperance Billiards Halls, Ltd.); High-rd (adjoining Nightingale public-house), shop and office, J. H. Tripp, Ltd.; Cline-rd., new offices, etc., The Standard Bottle Co., Ltd.; Hornsey Park-rd., shed, Forbes & Tate; Station-rd., alterations and additions, F. F. Tomlin.

Worthing.—T.C. passed plans: 6 houses, Rugby-rd., E. H. Barton, per A. T. W. Goldsmith; 4 houses, Phrosso-rd., E. J. Woodward.

York.—City Engineer been instructed by Estates Committee to report upon utilisation of site of exhibition buildings for public hall with seating accommodation for approximately 2,000 people.

FIRE.

Belfast.—Disastrous fire occurred, destroying six-story building of Spence, Bryson & Co., handkerchief manufacturers, Great Victoria-st., and causing damage to about £200,000.

TRADE NEWS

Change of Address.

Messrs. A. & F. J. Leather, Ltd., building contractors (late 17, Victoria-street, S.W.1), have removed to more commodious premises at 53, Southampton-street, Camberwell, S.E.5.

Restoration at Ilford Town Hall.

Messrs. Szerelmey, Ltd., have, we learn, been instructed to carry out restoration work at the Town Hall, Ilford, Essex.

Floor Clips.

Messrs. Gutteridge & Gutteridge, architects, of Southampton, have specified for the use of 47,500 "Bull Dog" floor clips at the new factory which is now being erected for the British American Tobacco Company at Southampton. Details of this clip are obtainable from Redalon, Ltd., Regent House, W.1.

Asphalte.

Ragusa Asphalte Paving Co., Ltd., announce that they have just opened a new depot and branch office at Worthing, Sussex, in order to be in closer touch with the requirements of the architects and builders in that county, and particularly in the various seaside towns. The branch will be fully equipped with plant and materials to enable the wishes of customers to be carried out with despatch, under the superintendence of the resident manager. The address of the office is 3, Ash-grove, Worthing. Telephone: Worthing 1999.

Building Development at Poole.

We learn that during the year ending December 31, 1928, no fewer than 829 sets of plans were approved by the Poole Town Council for new houses, public buildings, etc., in the borough. These included 603 houses.

PRICES CURRENT OF MATERIALS.*

Owing to the exceptional circumstances which prevail at the present time, prices of materials should be confirmed by inquiry.

BRICKS, &c.

Per 1,000 Alongside, in River Thames up to London Bridge.

	£ s. d.
Best Stocks	4 5 6
Second Hard Stocks	3 19 6

Per 1,000. Delivered at London Goods Stations.

	£ s. d.		£ s. d.
Flettons, at King's Cross	2 12 3	Best Blue Pressed Staffs	9 5 0
Do., grooved for Plaster ...	2 14 3	Do. Bullnose ...	9 15 0
Do., Bullnose...	3 7 3	Blue Wire Cuts	7 5 0

Best Stourbridge Fire Brick :—
2½ in. ..... 8 11 0 3 in. 10 3 0

GLAZED BRICKS—

Best White Ivory, and Salt Glazed Stretchers' ...	21 0 0	D'ble Str'tch'rs	29 10 0
		D'ble Headers ...	26 10 0
		One Side and two Ends ...	30 10 0
Headers	20 10 0	Two Sides and one End	31 10 0
Quoins, Bullnose and 4½ in. Flats	27 10 0	Splays, and Squints	28 0 0

Second Quality, £1 per 1,000 less than best. Cream and buff, £2 extra over white. Other colours. Hard Glaze, £5 10s. extra over white.

BREEZE CONCRETE SLABS
Delivered London

	s. d.		s. d.
2 in. per yd. super.	1 11	3 in per yd. super	2 9
2½ in. ,, ,,	2 4	4 in. ,, ,,	3 6

	s. d.	
Thames Ballast	9	9 per yd.
Pit Sand	12	0 ,, ,,
Thames Sand	12	6 ,, ,,
Best Washed Sand.....	12	6 ,, ,,
¾ in. Shingle for Ferro-Concrete	12	0 ,, ,,
¾ in.	12	6 ,, ,,
¾ in. Broken Brick.....	11	6 ,, ,,
Pan Breeze	8	0 ,, ,,

delivered 2 miles radius Paddington.

Per ton delivered in London area in full van loads.
Best Portland Cement. British. Standard Specification. Test £2 6 0 to £2 8 0 2/8. alongside at Vauxhall in 80-ton lots.

	£ s. d.
Ferrocrete per ton extra on above	0 7 6
Super Cement (Waterproof)	3 16 0
Roman Cement	8 15 0
Parian Cement.....	5 15 0
Keene's Cement, White	5 15 0
,, ,, Pink.....	5 10 0
Plaster, Coarse, Pink	3 0 0
,, ,, White	3 12 6
,, Fine	5 12 0
Sirapite, Coarse	3 9 0
,, Finish	3 17 0
Grey Stone Lime.....	2 10 9
Chalk Lime	2 10 9
Best Ground Blue Lias Lime	1 17 6
Hair ..... per cwt.	2 2 6
Granite Chippings	1 12 0

NOTE.—Sacks are charged 1s. 9d. each and credited 1s. 6d. if returned in good condition within three months carr. pd.
Stourbridge Fireclay in s'cks 37s. 0d. per ton at rly. dp.

STONE.

BATH STONE.—Delivered in railway trucks at Westbourne Park, Paddington, G.W.R., or South Lambeth, G.W.R., per ft. cube..... s. d. 2 10

BERE STONE—RANDOM BLOCK—
Free on rail at Seaton Station per ft. cube 2 3
Delivered free on rail Nine Elms, S.R. per ft. cube 3 1½
Selected approximate size one way, 1d. per cubic foot extra; selected approximately three sizes or for special work, 3d. per cubic foot extra.

PORTLAND STONE.—
Brown Whitbed, in random blocks of 20 ft. average, delivered in railway trucks at Nine Elms, S. Rly., South Lambeth Station, G.W.R., and Westbourne Park, Paddington, G.W.R., per ft. cube..... 4 4½
Do. do. delivered on road wagons at above stations, per ft. cube..... 4 5½
White basebed, 5d. per ft. cube extra.
NOTE.—1d. per ft. cube extra for every foot over 20 ft *average*, and ½d. beyond 30 ft.

HOPTON-WOOD STONE.—
Delivered at any Goods Station, London. s. d.
Random blocks from 10 ft. and over P. ft. cb. 14 0
Sawn two sides ,, 22 6
Sawn three or four sides ,, 27 6

YORK STONE, BLUE—*Robert's Hood Quality.*
Delivered at any Goods Station, London.
6 in., sawn two sides landings to sizes (under 30 ft. super)..... Per ft. super 5 6
5 in. rubbed two sides, ditto ..... ,, 6 0
3 in. sawn two sides slabs (random sizes) ,, 2 3½
2 in. to 2½ in. sawn one side slabs (random sizes) ..... ,, 1 6½
1½ in. to 2 in. ditto, ditto ..... ,, 1 3½

HARD YORK—
Delivered at any Goods Station, London.
Scappled random blocks ..... Per ft. cube 0 3
6 in. sawn two sides landing to sizes (under 40 ft. super) ..... Per ft. super 5 1½
6 in. rubbed two sides, ditto ..... ,, 6 1½
4 in. sawn two sides slabs (random sizes) ,, 2 1½
3 in. ditto ditto ,, 2 10
2 in. self-faced random flags.....Per yd. super 8 6

CAST STONE.

Delivered in London area in full van loads, per ft. cube: Plain, 8s. 6d.; Moulded, 9s. 6d.; Cills, 10s. 0d.

WOOD.

GOOD BUILDING DEAL.

Inches.	per stan.	Inches.	per stan.
4 × 11	£30 0	3 × 6	£21 0
4 × 9	26 0	3 × 11	25 0
4 × 8	25 0	2 × 11	26 0
4 × 7	23 0	3 × 9	24 0
3 × 8	22 0	2½ × 9	24 0
3 × 7	22 0	3 × 4½	21 0
2½ × 7	21 0	3 × 4	21 0

PLANED BOARDS.

1 × 11	£30 0	1 × 9	£28 0

PLAIN EDGE FLOORING

Inches.	per sq.	Inches.	per sq.
⅝	18/-	1¼	30/-
¾	21/-	1½	34/-
1	24/-		

TONGUED AND GROOVED FLOORING

Inches.	per sq.	Inches.	per sq.
1	24/-	⅝	16/6
1¼	30/-	¾	19/-
1½	34/-	1	24/-

MATCHING (BEST).

Ins. BATTENS.	s. d.	SAWN LATHS.	s. d.
¾ × 2 .....per 100 ft.	2 6	Per bundle	2 6

1" AND UP THICK.

	£ s. d.	£ s. d.
Dry Austrian Wainscot, per ft. cube	0 16 0	to 0 18 0
Dry American and/or Japanese Figured Oak, ft. cube.....	0 14 0	to 0 15 0
Dry American and/or Japanese Plain Oak, ft. cube	0 10 0	to 0 13 0
Dry sq. edged Honduras Mahogany, ft. cube.....	0 15 0	to 0 18 0
Dry Log cut Honduras Mahogany, ft. cube.....	0 16 0	to 1 1 0
Dry Cuba Mahogany, ft. cube...	1 1 0	to 1 10 0
Dry Teak, ft. cube	0 13 0	to 0 15 0
Dry American Whitewood, ft. cube	0 10 0	to 0 14 0
Best Scotch Glue, per cwt.	4 10 0	to —
Liquid Glue, per cwt.	4 7 0	to 5 10 0

SLATES.

First quality slates from Bangor or Portmadoc carriage paid in full truck loads to London Rate Station. Per 1,000.

	£ s. d.		£ s. d.
24 by 12	32 18 4	18 by 10	18 12 11
22 by 12	29 17 11	18 by 9	16 9 2
22 by 11	27 14 2	16 by 10	15 12 6
20 by 12	26 5 0	16 by 8	12 3 9
20 by 10	22 10 0		

TILES.

Delivered at London rate stations in full truckloads of not less than 6 tons. Per 1,000. f.o.r. London.

	£ s. d.
Best machine-made tiles from Broseley or Staffordshire district.....	5 7 6
ditto hand-made ditto	5 17 6
Ornamental ditto	6 2 6
Hip and valley tiles (per dozen) { Hand-made	0 9 6
{ Machine-made	0 9 0

METALS.

JOISTS, GIRDERS, &c., TO LONDON STATION, PER TON—

	£ s. d.
R.S. Joists, cut and fitted	12 10 0
Plain Compound Girders	14 10 0
,, Stanchions	16 10 0
In Roof Work	19 10 0

MILD STEEL ROUNDS.—To London Station, per ton

Diameter.	£ s. d.	Diameter.	£ s. d.
¼ in.	12 0 0	⅝ in. to ⅞ in.	10 15 0
⅜ in.	11 0 0	1 in. to 2½ in.	10 10 0

WROUGHT-IRON TUBES AND FITTINGS—
(Discount off List for lot of not less than £7 net value delivered direct from Works, 2½ per cent. less above gross discounts, carriage forward, if sent from London Stocks.)

	Tubes. Wrought Mild Steel.	Tubes. Genuine Staffs. Iron.	Fittings. ¼ in. and under.	Fittings. Over ¼ in.	Flanges. ¼ in. and under.	Flanges. Over ¼ in.
	%	%	%	%	%	%
Gas	67½	50	42½	45	52½	55
Water	63½	46½	37½	40	47½	50
Steam	60	42½	32½	35	42½	45
Galv. gas.....	55	37½	32½	35	42½	45
Galv. water	50	32½	27½	30	37½	40
Galv. steam	45	27½	22½	25	32½	35

C.I.—HALF-ROUND GUTTERS—London Prices ex Works

Per yd. in 6 ft. lengths.	Gutters.	Angles and Nozzles.	Stop Ends.
3 in.	1/3½	11½d.	3½d.
3½ in.	1/4½	1/1½	3½d.
4 in.	1/6	1/3	3½d.
4½ in.	1/7½	1/4½	4½d.
5 in.	1/10½	1/6½	5½d.

O.G. GUTTERS.

3 in.	1/8	1/4½	3½d.
3½ in.	1/8	1/4½	3½d.
4 in.	1/9½	1/4½	3½d.
4½ in.	1/11½	1/7½	4½d.
5 in.	2/4½	1/10½	5½d.

RAIN-WATER PIPES, &c.

Per yd. in 6 ft.	Pipe.	Bends, stock angles.	Branches, stock angles.
2 in. plain.....	1/10½	1/3	1/9½
2½ in. ,, ...	2/0½	1/4½	2/1½
3 in. ,, ...	2/6	1/9	2/7½
3½ in.	2/11½	2/0½	3/0½
4 in. ,, ...	3/5	2/6½	3/8½

L.C.C. COATED SOIL PIPES—London Prices ex Works.

	Pipe.	Bends, stock angles.	Branches, stock angles.
	s. d.	s. d.	s. d.
2 in. per yd. in 6 fts. plain	3 3	2 4½	2 10
2½ in. ,,	3 9	2 7½	3 7
3 in. ,,	4 6	2 10	4 2½
3½ in. ,,	4 11½	3 7	4 11½
4 in. ,,	5 5½	4 0½	5 9

L.C.C. COATED DRAIN PIPES—London Price ex Works

	Bends, stock Pipe, angles, stock angles.	s. d.	Branches, stock angles.	s. d.
3 in. per yd. in 9ft. lengths	4 4	5 1	8	9½
4 in. ,, ,,	4 10	5 8	10	0
5 in. ,, ,,	6 6	10 10	17	1
6 in. ,, ,,	6 8	13 2	21	9

Gasken for jointing, 38/6 per cwt.

IRON—	Per ton in London. £ s. d.		£ s. d.
Common bars.....	11 0 0	to	12 0 0
Staffordshire Crown Bars—Good merchant quality	11 10 0	to	12 10 0
Staffordshire Marked Bars.....	14 0 0	...	15 0 0
Mild Steel Bars	10 0 0	...	11 0 0
Steel Bars, Ferro-Concrete quality, basis price	10 0 0	...	11 0 0
Hoop iron, basis price	11 10 0	...	12 10 0
,, Galvanised	27 0 0	...	28 0 0
Soft Steel Sheets, Black—			
Ordinary sizes, to 20 g....	13 0 0	...	14 0 0
,, ,, ,, 24 g....	14 0 0	...	15 0 0
,, ,, ,, 26 g....	16 0 0	...	17 0 0
Sheets Flat Best Soft Steel, C.R. and C.A quality—			
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	15 0 0	...	16 0 0
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 22 g. and 24 g.....	16 0 0	...	17 0 0
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 26 g....	18 0 0	...	20 0 0
No. 1 quality £4 per ton extra.			
Flat and Galvanised Corrugated Sheets—			
Ordinary sizes, 6 ft. to 9 ft. to 20 g.	16 10 0	...	17 0 0
Ordinary sizes, 6 ft. to 9 ft. to 22 g. and 24 g.	17 0 0	...	18 0 0
Ordinary sizes, 6 ft. to 9 ft. to 26 g.	20 0 0	...	21 0 0
Sheets Galvanised Flat, Best quality—			
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. to 20 g. and thicker	21 0 0	...	22 0 0
Best Soft Steel Sheets, 22 g. and 24 g.	23 0 0	...	25 0 0
Best Soft Steel Sheets, 26 g.	24 10 0	...	25 10 0
Cut Nails, 3 in. to 6 in.....	18 0 0		
(Under 3 in. usual trade extras.)			

METAL WINDOWS.—Standard sizes, suitable for complete houses, including all fittings, painting two coats, and delivery to job, average price about 1s. 4d. to 1s. 7d. per foot super.

LEAD, &c.

(Delivered in London.)	£ s. d.
LEAD—Sheet English, 4 lb. and up	30 0 0
Pipe in coils	30 10 0
Soil pipe	33 10 0
Compo pipe	34 10 0

NOTE.—Country delivery, 20s. per ton extra; lots under 3 cwt. 3s. per cwt. extra, and over 3 cwt. and under 5 cwt., 1s. 6d. per cwt. extra. Cut to sizes 5s. cwt. extra.
Old lead, ex London area, at Mills ..... per ton 20 5 0

COPPER.

	s. d.
Seamless Copper tubes (basis)..... per lb.	1 1½
Strong sheet ..... ,,	1 0
Thin..... ,,	1 1
Copper nails ..... ,,	2 3
Copper wire ..... ,,	2 4

PLUMBERS' BRASS WORK.
Delivered in London.

NEW RIVER PATTERN SCREW DOWN BIB COCKS FOR IRON.

½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.
29/-	45/-	76/-	153/-	246/-	510/- per doz.

NEW RIVER PATTERN SCREW DOWN STOP COCKS AND UNIONS.

½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.
41/6	62/-	92/-	174/-	300/-	588/- per doz.

RIVER PATTERN SCREW DOWN MAIN FERRULES.

½ in.	¾ in.	1 in.
39/6	60/-	116/6 per doz.

CAPS AND SCREWS.

1¼ in.	1½ in.	2 in.	3 in.	3½ in.	4 in.
7/6	10/-	14/-	23/-	30/-	42/- per doz.

DOUBLE NUT BOILER SCREWS.

½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.
7/6	11/-	17/-	29/-	36/-	63/- per doz.

BRASS SLEEVES.

1¼ in.	2 in.	3 in.	3½ in.	4 in.
10/-	12/-	20/-	24/-	31/- per doz.

NEW RIVER PATTERN CROYDON BALL VALVES, S.F.

½ in.	¾ in.	1 in.	1¼ in.	1½ in.
35/-	56/-	98/-	162/-	228/- per doz.

DRAWN LEAD P. & S. TRAPS WITH BRASS CLEANING SCREW.

	1¼ in.	1½ in.	2 in.	3 in.
8 lbs. P. traps ...	33/-	41/-	56/-	101/- per doz.
8 lbs. S. traps ...	35/-	45/-	66/-	126/- ,,

TIN.—English Ingots, 2/6 per lb. SOLDER.—Plumber's 1/1. Tinmen's 1/4. Blowpipe 1/5 per lb.

PAINTS, &c.

Raw Linseed Oil, in pipes	per gallon	0 2 9	
,, ,, ,, in barrels ...	,,	0 2 11	
,, ,, ,, in drums ...	,,	0 3 1	
Boiled ,, ,, in barrels ...	,,	0 3 1	
,, ,, ,, in drums ...	,,	0 3 4	
Turpentine in barrels	,,	0 4 3	
,, in drums (10 galls)	,,	0 4 5	
Genuine Ground English White Lead, per ton		52 0 0	

(In not less than 5-cwt. casks.)
Extra for 1-cwt. kegs over 5-cwt. casks is 5/9 cwt.

* The information given on this page has been specially compiled for THE BUILDER, and is copyright. The aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the highest or lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

PRICES CURRENT OF MATERIALS (*contd.*)

PAINTS, &c. (*contd.*)

		£	s.	d.
GENUINE WHITE LEAD PAINT. "Father Thames," "Nine Elms," "Park," "Supremus," "St. Paul's," "Morganswyte," "Polaco," "J." Brand, and other best brands (in 14 lb. tins) not less than 5 cwt. lots ..	per ton delivered	70	10	
Red Lead, Dry (packages extra) ..	per ton	39	10	
Best Linseed Oil Putty	per cwt.	0	15	
Filleol	"	0	15	
Size. XD quality	ftn.	0	3	6

GLASS.

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES.

	Per ft.		Per ft.
15 oz. fourths ..	2½d.	32 oz. fourths	6d.
15 ,, thirds ..	3½d.	32 ,, thirds	8½d.
21 ,, fourths ..	3½d.	Obscured Sheet, 15 oz.	3½d.
21 ,, thirds ..	4d.	,, ,, 21 ,,	4½d.
26 ,, fourths ..	4d.	Fluted, 15oz.6½d., 21oz.	9d.
26 ,, thirds ..	6½d.	En'lled, 15 oz. 4½d., 21oz.	6d.

Extra price according to size and substance for squares cut from stock.

ENGLISH ROLLED plate in CRATES OF STOCK SIZES.

	Per ft.
¼ Rolled plate	4½d.
¼ Rough rolled	5½d.
⅜ Rough rolled	5½d.
Figured Rolled, Baltic, Oceanic, Arctic Stippolyte, and small and large Flemish White ..	5½d.
Ditto, tinted	8½d.
Rolled Sheet	4½d.
White Rolled Cathedral	4½d.
Tinted do.	6½d.

Cast plate is same price as rough rolled.

VARNISHES, &c.

		Per Gallon £	s.	d.
Oak Varnish	Outside	0	14	0
Fine ditto	ditto	0	16	0
Fine Copal	ditto	0	18	0
Pale Copal	ditto	1	0	0
Pale Copal Carriage	ditto	1	4	0
Best ditto	ditto	1	12	0
Floor Varnish	Inside	0	18	0
Fine Pale Paper	ditto	0	18	0
Fine Copal Cabinet	ditto	1	2	6
Fine Copal Flatting	ditto	1	0	6
Hard Drying Oak	ditto	0	18	0
Fine Hard Drying Oak	ditto	0	19	0
Fine Copal Varnish	ditto	1	0	0
Pale ditto	ditto	1	2	0
Best ditto	ditto	1	12	0
Best Japan Gold Size		0	12	6
Best Black Japan		0	10	6
Oak and Mahogany Stain (water)		0	12	0
Brunswick Black		0	7	6
Berlin Black		0	14	0
Knotting (patent)		1	5	0
French and Brush Polish		0	17	0
Liquid Dryers in Terebine		0	9	0
Culrass Black Enamel		0	7	0

NEW BUILDINGS IN SCOTLAND

Ayr.—ADDITIONS.—Mr. Allan Stevenson, architect, of Cathcart-street, is preparing ... is for the erection of additions at the County Buildings, High-street.

Glasgow. — HOUSING. — Tenders for the various works in connection with the building of 492 tenement houses by the Glasgow Corporation Housing Department at Haghill, in the eastern district of the city, have been recommended for acceptance. The offers amount in all to about £150,000. The houses will be of three and four apartments.

Greenock. — EXTENSIONS. — The Greenock Dean of Guild Court has granted warrant for alterations and extensions to the Picture House, West Blackhall-street.

Turriff.—HOUSES.—The Town Council have decided to erect a further 34 houses at the east end of Chapel-street. Twelve of these houses are to be built at once. Mr. W. L. Duncan is the architect.

TOWN PLANNING PROGRESS

The following progress in town planning in England and Wales for the month ended October 31, 1928, is recorded by the Town Planning Department, Ministry of Health :—

Preliminary statement approved (Stage BB) :—

Surrey : Wimbledon T.C.

Preliminary statements received (Stage B) :—

Lancashire : Lytham St. Annes T.C.
Staffordshire : Smethwick T.C.
Sussex : Portslade-by-Sea U.D.C. (main area).

Resolutions received (Stage A) :—
Cambridgeshire : Cambridge T.C. (No. 2).
Durham : Sunderland T.C. (No. 2).
Essex : Woodford U.D.C. (No. 2).
Lancashire : Morecambe and Heysham T.C.

BUILDING TRADE WAGES IN SCOTLAND.*

THE following are the present rate of wages in the building trade in the principal towns of Scotland. Every endeavour is made to ensure accuracy, but we cannot be responsible for errors that may occur.

	Masons.	Bricklayers.	Carpenters, Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Labourers—Masons'‡ Bricklayers'‡ Plasterers'†
Aberdeen	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Airdrie	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Alexandria	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Arbroath	1/6½	1/6½	1/6½	1/7½	1/6½	1/6½	1/5½	1/1
Ayr	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	1/2½
Bathgate	1/7½	1/7½	1/7½	1/7½	1/7½	1/7½	1/6½	1/2 to 1/3
Blairgowrie	1/7	1/7	1/7	1/7½	1/5	1/7	1/4	10d. to 1/-
Bo'ness	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Coatbridge	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Dumbarton	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Dumfries	1/6½	1/6½	1/7½	1/6½	1/6½	1/6½	1/6½	1/2
Dundee	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/3 †1/2½
Dunfermline	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/7½	‡1/2½ †1/2½
Edinburgh	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/3½ †1/2½
Falkirk	1/7½	1/7½	1/7	1/8	1/7	1/7	1/6½	1/2½
Fort William	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/2
Galashiels	1/6½	1/7	1/6½	1/7	1/6½	1/6½	1/7	1/2
Glasgow	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Greenock	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/7	1/2½
Hamilton	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2
Hawick	1/7	1/7	1/7	1/7-1/7½	1/7	1/7	1/7	1/2½
Helensburgh	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/7	1/2½
Inverness	1/6	1/6	1/6	1/6	1/6	1/6	1/6	1/- to 1/2
Kilmarnock	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	1/2½
Kirkcaldy	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Kirkwall	1/5	1/5	1/4	1/5	1/5	1/4	1/4	1/-
Lanark	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Leith	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/3½ †1/2½
Motherwell	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Perth	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½
Stirling	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/7½	1/2½
Stirlingshire (Eastern District)	1/7½	1/9	1/7½	1/8½	1/7½	1/7½	1/8	1/2½
Wishaw	1/7½	1/7½	1/7½	1/8½	1/7½	1/7½	1/8	‡1/2½ †1/2½

* The information given in this table is copyright. The rates of wages in the various towns in England and Wales are given on page 133.

NEWS ITEMS

Granite Monuments.

The Standing Committee appointed by the Board of Trade have reported on their inquiry as to whether imported monuments and grave enclosures of granite should be required to bear an indication of origin. The report is now obtainable from the Stationery Office, or through any bookseller, price 2d.

The Salford Cattle Market Site.

Northern Olympia, Ltd., has been registered as a public company, state Messrs. Jordan & Son, Ltd., to acquire the Salford Cattle Market from the Salford Corporation, and to erect thereon an exhibition hall and other buildings, etc. The nominal capital is £500,000, in 4s. shares.

The Ironbridge Electricity Scheme.

In connection with the recent decision of the West Midlands Joint Electricity Authority to proceed with the erection of the super power station, to cost £3,000,000, two appointments have been made. Mr. Ivan Doughtry, of Bedford, has been appointed as advisory architect for the building and civil engineering work, and Mr. Henry Vale, of Wolverhampton, has been appointed as quantity surveyor, in respect of the first section of the station.

Foreign Cement.

We take the following from the *Daily Mail* :—Great indignation has been caused in building circles by the fact that the London County Council is permitting practically the free use of foreign materials in its various housing schemes. The matter has been brought to a head in connection with the block dwellings and shops on the Holland Estate at Stepney, E. The successful contractor has been seeking quotations for 400 tons of foreign cement for this particular work. On the matter being brought to the notice of the County Council, it was officially stated that the contractor could use what cement he pleased so long as it satisfied the requirements of the Council's architects and surveyors.

Staff Dinner.

The staff and workpeople of Messrs. A. Edmonds & Co., Ltd., were entertained to dinner, on the invitation of the directors, on Friday, December 21. The gathering, which numbered about 120, was addressed during the proceedings by Mr. S. Lines, who referred to the advantages of co-operation, and complimented the firm on its progressive methods. An entertainment followed, consisting of musical items, whist drive and dance.

National Health and Pensions Insurance.

By virtue of the National Health Insurance Act, 1928, which came into force on January 1, the following class of employment is brought within the scope of compulsory insurance under the National Health Insurance Act, 1924, and the Widows', Orphans' and Old Age Contributory Pensions Act, 1925 :—

"Employment by way of manual labour under a contract for the performance of such labour for the purposes of any trade or business, except in so far as such employment is excluded by a special order."

The Act also provides that the person for the purposes of whose trade or business the work is performed shall be deemed to be the employer, and accordingly he is the person responsible for payment of contributions. The new clause does not apply to Unemployment Insurance.

The following are some of the classes of employment which may come under the new provision :—Sub-contractors in the building or other trades, such as furniture or cabinet-making, floor-laying, mining and quarrying; contractors for stone-breaking and other road work; brickmakers under contract; timber fellers working for timber merchants. Full particulars of these extensions of insurance are given in a leaflet just issued by the Ministry of Health.

CURRENT PRICES FOR BUILDING WORK IN LONDON*

EXCAVATOR.

		s.	d.
Digging and throwing or wheeling and filling carts, and carting away to shoot—6 ft. deep	per yard cube	11	0
Add if in clay	" "	1	0
Add for every additional depth of 6 ft.	" "	0	6
Planking and strutting to trenches	per foot super	0	5
Do. to sides of excavation, including shoring	" "	1	0

CONCRETOR.

		s.	d.
Portland cement concrete in foundation 1 to 6	per yard cube	38	0
Add if in underpinning in short lengths	" "	7	0
Add if in floors 6 in. thick	" "	3	3
Add if in beams	" "	3	9
Add if aggregate 1 : 2 : 4	" "	10	0
Add for hoisting not exceeding 10 ft. beyond the first 10 ft.	" "	2	6

BRICKLAYER.

		£	s.	d.
Reduced brickwork in lime mortar and Fletton bricks	per rod	32	0	0
Add if in stocks	"	7	10	0
Add if in Staffordshire blues	"	22	0	0
Add if in Portland cement and sand	"	1	10	0

FACINGS.

		s.	d.
Extra for facing in English or Flemish bond for every 10s. per 1,000 over the price of the common bricks	per ft. super	0	0	1½

POINTING.

		s.	d.
Neat flat struck or weathered joint	" "	0	0	3

ARCHES.

		s.	d.
Extra only to the price of ordinary brickwork :—			
Fair external in half brick rings	" "	0	0	10
Axed in stocks	" "	0	1	9
Rubbed and gauged jointed in putty camber or segmental	" "	0	6	0

SUNDRIES.

		s.	d.
Damp course in double course of slates breaking joint and bedded in Portland cement	" "	0	1	0
Setting ordinary register grates and stoves	each	1	0	0
Setting kitchener, including forming flues, &c., with all necessary fire bricks	"	4	15	0

ASPHALTER.

		s.	d.
Half-inch horizontal damp course	per yard super	4	6
Three-quarter-inch vertical damp course	" "	9	6
Three-quarter-inch on flats in two thicknesses	" "	6	3
Angle fillet	per foot run	0	3
Skirting and fillet 6 in. high	" "	1	2

MASON.

		s.	d.
York stone templates fixed	per foot cube	13	0
York stone sills fixed	" "	22	0
Bath stone and all labour fixed	" "	10	6
Beer stone and all labour fixed	" "	15	0
Portland stone fixed	" "	20	0

SLATER.

		s.	d.
Welsh 16 in. × 8 in. 3 in. lap, including nails	per square	72	9
Do. 20 in. × 10 in. Do. Do.	"	80	9
Do. 24 in. × 12 in. Do. Do.	"	90	0

CARPENTER AND JOINER.

		s.	d.
Fir framed in plates	per foot cube	5	0
Do. joists	" "	5	6
Do. roofs, floors and partitions	" "	6	0
Do. trusses	" "	8	6

		¾"	1"	1¼"	2"
Deal rough close boarding	per sq.	35/6	40/-	45/-	72/-

		s.	d.
Flat centering for concrete floor, including struts or hangers	"	50	0
Do. to beams	per ft. sup.	0	11
Centre for arches	"	1	6
Gutter boards and bearers	"	1	0

FLOORING.

		¾"	1"	1¼"	1½"
Deal-edges shot	per sq.	—	44/6	53/-	60/6
Do. tongued and grooved	"	—	49/-	57/6	65/-
Do. matchings	"	45/-	51/-	—	—
Moulded skirting, including backings and grounds	per ft. sup.	1/6	1/9	2/-	2/6

SASHES AND FRAMES.

		s.	d.
One-and-a-half moulded sashes or casements	per foot super	1	10
Two Do. Do. Do.	" "	2	1
Add for fitting and fixing	" "	0	3
Deal-cased frames with 1 in. inner and outer linings, 1½ in. pulley stiles tongued to linings, hard wood sills with 2 in. moulded sashes in squares, double hung, double hung with pulleys, lines and weights; average size	" "	3	9

DOORS.

		1¼"	1½"	2"
Two-panel square framed	per ft. sup.	2/1	2/4	2/6
Four-panel Do.	"	2/5	2/8	2/11
Two-panel moulded both sides	"	2/8	2/11	3/2
Four-panel Do. Do.	"	2/11	3/2	3/5

CARPENTER AND JOINER—continued.

FRAMES.

		s.	d.
Deal wrot moulded and rebated	per foot cube	14	0

		1"	1¼"	1½"
Plain deal jamb linings framed	per ft. sup.	1/7	1/8	1/11
Deal shelves and bearers	"	1/4	1/6	1/9
Add if cross-tongued	"	2d.	2d.	2d.

STAIRCASES.

	1"	1¼"	1½"	2"	2½"
Deal treads and risers in and including rough brackets	2/1	2/4	2/9	—	—
Deal strings wrot on both sides and framed	1/8	2/-	2/2	2/8	—

		s.	d.
Housings for steps and risers	each	0	11
Deal balusters, 1 in. × 1½ in.	per ft. run	0	9
Mahogany handrail : average, 3 in. × 3 in.	" "	6	0
Add if ramped	" "	12	0
Add if wreathed	" "	24	0

FIXING ONLY IRONMONGERY (INCLUDING SCREWS).

6 in. barrel bolts	8½d.	Rim locks	2/-
Sash fasteners	11½d.	Mortice locks	4/6
Casement fasteners	1/5	Patent spring hinges and letting into floor and making good	19/-
Casement stays	1/2		
Cupboard locks	1/5		

FOUNDER AND SMITH.

		s.	d.
Rolled steel joists	per cwt.	16	3
Plain compound girders	"	19	0
Do. stanchions	"	21	9
In roofwork	"	27	6

RAIN-WATER GOODS.

		3"	4"	5"	6"
Half-round plain rebated joints	ft. run	1/6	1/9	2/-	2/6
Ogee Do. Do.	"	1/9	2/-	2/6	3/3
Rain-water pipes with ears	"	1/9	2/7	—	—
Extra for shoes and bends	each	4/4	5/11	—	—
Do. stopped ends	"	1/11	2/4½	3/7	4/-
Do. nozzles for inlets	"	2/2	2/7	3/10	4/3

PLUMBER.

		s.	d.
Milled lead and laying in flashings and gutters	per cwt.	43	0
Do. Do. in flats	"	42	0
Extra labour and solder in coated cesspools	each	6	9
Welf joint	per ft. run	0	6
Soldered seam	" "	1	3
Copper nailing	" "	0	3

		½"	¾"	1"	1¼"	2"	4"
Drawn lead waste	per ft. run	1/2	1/9	2/-	3/4	4/-	—
Do. service	"	1/8	2/2	2/7	3/10	—	—
Do. soil	"	—	—	—	—	—	6/9
Bends in lead pipe	each	—	—	—	—	3/3	8/2
Soldered stop ends	"	1/2	1/8	2/1	2/10	3/6	—
Read lead joints	"	11d.	1/-	1/3	1/11	2/4	4/10
Wiped soldered joints	"	2/10	3/6	4/-	4/11	6/6	9/9
Lead traps and cleaning screws	"	—	—	—	14/7	19/6	—
Bib cocks and joints	"	6/4	9/7	15/4	41/-	—	—
Stop cocks and joints	"	15/4	17/2	25/8	64/-	—	—

PLASTERER.

		s.	d.
Render, float and set in lime and hair	per yard sup.	2	6
Do. Do. Sirapite	" "	2	9
Do. Do. Keen's	" "	4	0
Add saw lathing	" "	1	7
Add metal lathing	" "	2	6
(Not including hangers or runners, etc., for suspended ceilings.)			
Portland cement screed	" "	2	2
Do. plain face	" "	3	3
Mouldings in plaster	per 1 girth	0	1½
One-and-a-half granolithic paving	per yard sup.	5	6

GLAZIER.

		s.	d.
21-oz. sheet plain	per foot sup.	0	8½
26-oz. Do.	" "	1	0
Obscured sheet	"	1	1
⅛-in. rolled plate	" "	0	9
¼-in. rough rolled or cast plate	" "	0	10½
¼-in. wired cast plate	" "	1	4

PAINTER.

		s.	d.
Preparing and distempering, 2 coats	per yard sup.	0	9
Knotting and priming	" "	0	7
Plain painting, 1 coat	" "	0	9
Do. 2 coats	" "	1	2
Do. 3 coats	" "	1	9
Do. 4 coats	" "	2	4
Graining	" "	2	3
Varnishing twice	" "	1	9
Sizing	" "	0	3
Flatting	" "	0	7
Enamel	" "	1	1
Wax polishing	per foot sup.	0	6
French polishing	" "	1	2
Preparing for and hanging paper	per piece, 2/- to	4/-	

* These prices apply to *new buildings only*. They cover superintendence by foreman and carry a profit of 10% on the prime cost without establishment charges. A percentage of 1½ should be added for Employers' Liability and National Health and Unemployment Acts and from 1s. 6d. per £100 for Fire Insurance. The whole of the information given on this page is copyright.

NEW COMPANIES

THE particulars quoted below have been compiled by Messrs. Jordan & Sons, Ltd., Company Registration Agents, of 116 and 117, Chancery-lane, W.C.2, from the documents available at the Companies' Registry.

EXTRAORDINARY, LTD. (234,971). Registered November 21. 12, Norfolk-street, W.C.2. House decorators, sanitary and electrical engineers, gas-fitters, estate agents, builders, etc. Nominal capital, £2,000.

ELLIS (KENSINGTON), LTD. (234,931). Registered November 19. 7, Kendrick-mews, South Kensington, S.W.7. Plumbing contractors, sanitary, hot-water and heating specialists. Nominal capital, £3,000.

J. S. EARNSHAW, LTD. (234,958). Registered November 20. Castlegate Joinery Works, Castlegate, Stockton-on-Tees. Builder and contractor. Nominal capital, £10,000.

HORBURY QUARRY CO., LTD. (234,957). Registered November 20. Quarry and mine owners, etc. Nominal capital, £1,500.

HENRY BOOT & SONS (SCOTLAND), LTD. (234,956). Registered November 20. 152, Moore-street, Sheffield. Builders and public works contractors, etc. Nominal capital, £20,000.

VAR/NAMEL, LTD. (234,889). Registered November 16. Court-chambers, 15, Mawdsley-street, Bolton. Manufacturers of and dealers in paints, varnishes and enamels, etc. Nominal capital, £1,000.

OKEHAMPTON BRICK AND STONE CO., LTD. (234,845). Registered November 15. Brick works in Okehampton Hamlet, Devon, and to carry on business as indicated by the title. Nominal capital, £10,000.

JAMES ROGERS & SON (BEXHILL), LTD. (234,804). Registered November 14. Builder and contractor. At Hastings-road, Bexhill. Nominal capital, £4,500.

W. R. ROACH, LTD. (234,816). Registered November 14. 7, High-street, Croydon, Surrey. Builders, contractors, plumbers and joinery manufacturers, etc. Nominal capital, £5,000.

TEESDALE LIME AND ROADSTONE CO., LTD. (234,856). Registered November 15. Quarry-owner, carried on at the Teesdale Lime Works and at Skears Limestone Quarries, both in Middleton-in-Teesdale, Durham. Nominal capital, £1,000.

RUSHTON TRACTORS, LTD. (234,852). Registered November 15. Mechanical, electrical, constructional and general engineers and contractors, etc. Nominal capital, £5,000. C. W. Reeve, Brook House, Woodford Green, Essex.

LAND AND INDUSTRIES, LTD. (234,877). Registered November 16. Lay-out land for building purposes, etc. Nominal capital, £100. D. S. Smith, "Colonia," St. Neots, Hunts.

TENDERS

* Denotes *accepted*.
† Denotes *provisionally accepted*.
‡ Denotes *recommended for acceptance*.
§ Denotes *accepted subject to modifications*.
¶ Denotes *accepted by H.M. Office of Works, and H.M. War Office*.

Ashford.—60 non-parlour type houses at Beaver-lane, for the U.D.C. Mr. W. Bowles, architect, Elwick-road :—

J. Morgan, Neath	£28,518 0 0
J. Guttridge & Sons, Ltd., Peterborough	26,638 0 0
W. Shippam, Ashford	26,012 12 0
Marshall Hamer, Ltd., London	25,962 0 0
W. T. Burrows & Son, Maidstone	25,695 0 0
T. S. Gwinnett, Ashford	25,622 8 0
R. J. Barwick, Dover	25,371 11 11
Norman Smith & Son, Maidstone	25,253 0 7
Pearce Bros., Maidstone	24,974 0 0
F. W. Beach & Co., Brighton	24,875 0 0
D. Godden & Son, Ham Street	24,800 0 0
Martin & Newman, Maidstone	24,139 0 0
R. Mansell, Croydon	23,997 0 0
Whiting Bros., Faversham	23,772 0 0
W. F. Woodgate, High Halden	23,607 0 0
Blackwell & Meyer, Bexley Heath	23,372 4 9
S. H. Howland, Ashford	23,354 10 6
Cordite Construction, Ltd., London	22,344 0 0
Franklin & Co. (Erith, Ltd.), Erith	22,032 0 0
R. Lawrence & Sons, Maidstone	21,966 0 0
Pearson & Blackwell (Doncaster), Ltd., Doncaster	20,719 12 10
*East Kent Building Co., Dover	20,250 0 0

Barking Town.—Laying of about 600 lin. yards of 9-inch diameter glazed stoneware pipe intercepting sewer, including a number of manholes, ventilators, etc., together with the erection and equipment of pump-house, pumping gear and electrical control, for the West Roding sewerage, for the U.D.C. Mr. A. A. Lay, engineer and surveyor :—

Winslade Bros., Seven Kings	£11,260 0 0
D. T. Jackson, Ltd., Barking	7,028 16 8
W. & C. French, Buckhurst Hill	6,774 6 11
*T. W. Pedrette, Bush Hill Park	5,500 15 9

Belfast.—Premises in King-street and Castle-treet, for Mr. B. O'Kane. Mr. C. MacAlister, architect, 12, Sussex-place :—

*McMullan Bros., Belfast.

Belfast.—Shops and dwelling-houses in Upper Newtownards-road, for Mr. Bernard M'Mahon Mr. C. MacAlister, architect, 12, Sussex-place :—

*Thos. McKee & Sons, Ltd., Belfast.

Birmingham.—New showrooms and offices for Messrs. Halford Cycle Co., Ltd., in Corporation-street. Messrs. E. Harper, Brother & Co., architects, Corporation-street :—

Contractors—
*W. J. Whittall & Son.
Steelwork—
*C. Wade & Co., Ltd.
Glazing—
*Hill Bros., Ltd.
(All of Birmingham.)

Blackpool.—Additions to Waterloo Council school, for the C.B. :—

*Keenan & Yates, Ltd.

Blackpool.—Erection of lavatories in Stanley-park, for the C.B. :—

*Atherton Bros. (Blackpool), Ltd.

Bridlington.—Alterations and additions to 83, 85 and 87, Hilderthorpe-road, for Mr. E. Wilson. Mr. J. E. Earnshaw, architect and surveyor, Estate Office, Kingsgate :—

Bricklayer, etc.—
*H. E. Turner & Son, Ltd.
Slater—
*Dawber, Townsley & Co., Ltd.
Carpenter and Joiner—
*W. & F. Usher.
Plumber and Electrician—
*[illegible] Ellerington.
(All of Bridlington.)

Bridlington.—Residence on the Sands Cottage estate, for Mrs. J. G. Gant. Mr. F. Vaux, F.R.I.B.A., architect, Danesmoor-chambers, Quay-road :—

*J. M. Smallwood & Sons, Bridlington.

Burgess Hill.—16 houses, for the U.D.C. Mr. W. E. Hancock, architect and surveyor :—

Pittom & Payne, Rottingdean	£8,176
C. L. White, Scaynes Hill	7,565
A. Saunders, Brighton	6,950
J. Wright & Son, Uckfield	6,523
C. V. Hobden, Ardingly	6,429
A. Baker, Burgess Hill	6,320
Edwards & Co., Burgess Hill	6,320
Lawes, Cherry & Co., London	6,080
A. J. Mighell, Burgess Hill	6,062
Collins & Mighell, Burgess Hill	6,048
H. White, Haywards Heath	6,000
*A. K. Jones & Son, Burgess Hill	5,888
Chappell & Co., Liverpool	5,700

(Subject to sanction of M.H.)

Caterham.—Cleaning, painting and repairs at the Mental Hospital, for the M.A.B. :—

Norris & Co. (Builders), Ltd., Sunningdale	£2,385 0
Passnidge & Son, Ltd., Uxbridge	1,997 0
Falkus Bros., Ltd., London	1,890 0
Thomas Carrington & Co., Ltd., Beckenham	1,880 0
R. Mansell, Croydon	1,797 0
Mond Staffordshire Refining Co., Ltd., London	1,790 0
W. O. Everitts, Ltd., Croydon	1,725 0
Lilly & Sons, London	1,675 0
A. H. Inns, Ltd., London	1,587 0
H. W. Yates, Sunningdale	1,567 0
Demolition & Construction Co., Ltd., London	1,514 13
E. Proctor & Sons, London	1,498 0
*H. Lawrence & Sons, Worksop	1,420 0

Cheltenham.—Alterations to All Saints' Schools. Messrs. L. W. Barnard & Partners, architects :—

*H. J. Trigg £1,509

Cheltenham.—New house in Hatherley. Messrs. L. W. Barnard & Partners, architects :—

*S. C. Morris & Son £1,525

Churwell.—New R.C. church at Bland-road :—

*Harrison, Spenseley & Sons.

Coulsdon and Purley.—Pavilion in the Coulsdon Memorial ground, for the U.D.C. :—

E. G. Cusden & Son, South Croydon	£1,083 0 0
W. H. Brown (Leatherhead), Ltd., Dorking	984 0 0
W. O. Everitts, Ltd., Croydon	954 0 0
R. Mansell, Croydon	920 0 0
Burnand & Pickett, Ltd., Wallington	919 0 0
Dolby & Allen, Coulsdon	905 6 10
H. Bacon & Son, Coulsdon	912 0 0
(alternative)	805 0 0

Coventry.—Additions at the premises of the Maudsley Motor Co., Ltd. Mr. T. David Griffiths, architect, Hertford-chambers, Hertford-street :—

*W. H. Jones & Son, Coventry.

Crewe.—Improvements to the "Burrell Arms," West-street, for Messrs. Threlfall's Brewery, Ltd., Cooke-street, Salford :—

*F. Cotclough, Crewe.
*Faience Work Doulton & Co., Ltd., Manchester.

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Darenth.—Covering work in laundry and boiler house at the Darenth Training Colony, for the M.A.B.:—

C. Goodman & Co., Ltd., London	£148 3 8
*W. J. Tranter, Ltd., Tipton	115 0 0
	less 5%
Sutcliffe Bros. & Bryce, Ltd., Wanstead, E.	97 14 9

Dewsbury.—Garage in Crackenedge-lane, Dewsbury. Mr. T. W. Sharpe, L.R.I.B.A., architect, Aire-street, Huddersfield-road. Quantities by Mr. W. Hamilton Fearnley, Featherstone:—

Masons—

Milnes Hanson, Contractor, Shaw Cross, Dewsbury	£1,516 12 3
J. B. Allatt & Son, Heckmondwike	1,497 0 0
E. F. Kirby, Ravensthorpe	1,941 14 11
W. Thompson, Dewsbury	1,577 3 10
Tom Horsfall (Derby), Ltd., Liversedge	1,854 0 0
C. Whitehead & Son, Ravensthorpe	1,758 18 8
†Hinchcliffe Oldroyd, Ossett	1,400 0 0
Wm. Scott & Sons, Dewsbury	1,593 0 0

Joiners—

John Richardson & Son, Staincliffe	338 19 0
Wortley & Boothroyd, Ravensthorpe	374 12 0
†J. W. Thornton, Dewsbury	324 7 0

Plumbers—

J. A. Schorah, Ravensthorpe	225 0 0
†Frank Newsome, Ltd., Dewsbury	197 0 0

Dewsbury.—Shelter at the Earlsheaton-park, for the C.B.:—

*A. C. Smith, Dewsbury	£163 6

Doncaster.—For (*a*) refreshment rooms; and (*b*) band stand in Hexthorpe Flatts, for the C.B. Mr. R. E. Ford, Estate Surveyor, 3, Priory-place:—

(*a*)—

*T. H. Wilburn, Doncaster	£1,693

(*b*)—

*Walter Firth, Ltd., Doncaster	480

Edinburgh.—Medical Officer's house, at Craigleith Hospital, for the P.C. Mr. J. M. Johnston, F.R.I.B.A., architect, 47, Charlotte-street, Leith:—

All trades—

*Thos. Millar & Co., Ltd.	£436 0 0

Electric light and power—

*R. Edgar & Co.	121 5 9

Painters' work—

*H. Muirhead & Son	100 0 0

(All of Leith.)

Edinburgh.—Painting works at Craigleith Hospital, for the P.C. Mr. J. M. Johnston, F.R.I.B.A., architect, 47, Charlotte-street, Leith:—

*P. & J. Gordon, Edinburgh	£397 0 0

Herne Bay.—Internal cleaning and painting at the St. Anne's Home, for the M.A.B.:—

F. Firth, Shipley	£305 10 0
Woolf Bros., Herne Bay	261 17 11
B. Cane & Son, Herne Bay	209 17 0
C. Crouch & Son, Herne Bay	209 0 0
Demolition and Construction Co., Ltd., London	189 10 8
Mond Staffordshire Refining Co., Ltd., London	185 19 6
A. H. Inns, Ltd., London	180 0 0
*J. B. Sharman, Ltd., Ramsgate	170 0 0

Laughton.—12 houses, for the R.D.C.:—

*Mollekin & Sons	£3,500

Lewes.—Alterations and additions to the Crown Hotel, for Messrs. Tamplin & Sons Brewery, Ltd.:—

*Ringmer Building Works.	

Liverpool.—Exterior painting and general repairs at Old Swan Police Station, for the T.C. Land Steward and Surveyor:—

*Dent & Graham, Walton	£137

Liverpool.—New heated frame at Bowring Park, for the T.C.:—

*R. Jones & Co., Liverpool	£297

Liverpool.—Painting and decorating portions of the interior of the Police Courts in Dale-street, for the T.C. Land Steward and Surveyor:—

*W. J. Woosey, Ltd., Liverpool	£185 10 6

Liverpool.—Patients' Canteen building for the Fazakerley Sanatorium, for the T.C. Land Steward and Surveyor:—

*W. D. Williams, Liverpool	£389

Liverpool.—Provision of new shop front, lowering ground floor, alterations to lavatory arrangements and drainage at premises, 183, Brownlow Hill, for the T.C.:—

*S. Hayes, Liverpool	£174

Liverpool.—Sports Pavilion, etc., at elementary schools playing field, in Townsend-lane, Clubmoor, for the T.C. Mr. A. D. Jenkins, F.S.I., Land Steward and Surveyor:—

*Brookfield Bros., Liverpool.	

London.—3 non-parlour and 2 parlour type houses, on the Westhorne-avenue, for the Woolwich B.C.:—

*M. Hamer, London	£2,515

London.—Block of office premises in Vauxhall Bridge-road, S.W.:—

Contractors—

*J. Smith & Sons (Norwood), Ltd., London.	

Steelwork—

*Fleming Bros., Glasgow.	

London.—Erection of boundary fence at the Orchard Hospital, for the M.A.B.:—

W. A. Skinner, Long Ditton	£2,635 10
C. H. S. Nunn, Ltd., Gipsy Hill	1,540 0
E. Proctor & Sons, Plumstead	1,530 0
Astolat Co., Ltd., Guildford	1,316 0
*D. C. Bowyer, Belvedere	1,151 17

London.—Alterations to paint and coach shops, etc., at the Mead Works, for the M.A.B.:—

W. F. Goodchild	£154 0
Thomas Carrington & Co., Ltd., Beckenham	139 14
J. Parsons	131 0
W. J. Marston & Son	129 15
*C. H. Boyd & Son, Ltd.	123 0

(All of London.)

Lowestoft.—Repairs to boiler flues at the St. Luke's Hospital, for the M.A.B.:—

R. C. Todd & Sons, Ltd., Lowestoft	£195 19 6
W. J. Croft, Lowestoft	195 0 0
Searles & Wilton, Lowestoft	188 0 0
Wm. Hamer & Sons, Ltd., Bury	184 0 0
H. Windsor & Co., Ltd., London	140 0 0
*W. Neil & Co., London	125 0 0

Maldon.—8 dwellings at Cripplegate, Southminster, for the R.D.C. Mr. Wm. Almond, surveyor, 6, Market-hill:—

†F. A. Fordham & Sons, Laindon	£2,901 6

Manchester.—Additions to the Higher Ormond-street Central school for boys, Chorlton-on-Medlock, for the T.C. Education Offices, Deansgate. Architects, Manchester Education Committee's Staff:—

†Tinker & Young, Manchester.	

Manningham.—New kitchen block at the Children's Hospital, St. Mary's-road. Mr. Wm. Illingworth, architect:—

Mason—

*F. G. Burgess.	

Joiner—

*W. C. Bogg & Son.	

Asphalter—

*Tunstalls Seyssel & Limmer Rock Asphalte Co., Ltd.	

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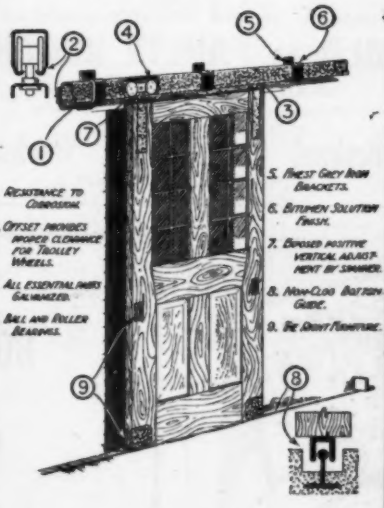
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Margate.—Painting and decorative repair to the Board's smallpox hospital and exterior of two cottages on the Ramsgate-road, for the Isle of Thanet Joint Hospital Board. Mr. F. M. Shea, architect, Wickens, Salmestone-rise, Margate:—

Jones & Son, Margate	£489 5 6
Baker & Sons, Margate	359 0 0
F. P. Allen, Westwood	310 0 0
T. E. Bax, Ramsgate	296 10 0
Payne & Son, Shipley	287 0 0
Demolition & Construction Co., London	239 17 0
Darby & Martin, Ramsgate	235 0 0
*T. H. Davis, Ramsgate	115 3 0

Middlesex.—For erection of first portion of buildings at the Middlesex Colony, Porters Park, Shenley, for the C.C. Mr. H. G. Crothall, F.R.I.B.A., County Architect:—

James Carmichael, Ltd., London	£55,987
Pitcher Construction Co., Ltd., Hornsey	49,570
William Lacey, Hounslow	49,300
Limpus & Son, Kingston-on-Thames	48,966
Albert Monk, London	48,760
J. E. Billings & Co., Ltd., London	48,689
G. Godson & Sons, Ltd., London	48,420
Edwards Construction Co., Ltd., London	47,450
Henry Knight & Son, Tottenham	46,939
Holloway Brothers, London	46,878
Knox & Dyke, Ltd., London	46,644
Thomas Rowbotham, Birmingham	46,292
Walter Lawrence & Son, Ltd., London	44,842
Wilson Lovatt & Sons, Ltd., Wolverhampton	44,532
Sir Lindsay Parkinson & Co., Ltd., London	44,486
C. Miskin & Sons, Ltd., St. Albans	44,164
Samuel Foster, Ltd., Bedford	43,867
‡John Laing & Son, Ltd., Mill Hill	43,661

Newport (Mon.).—Erection of the Oswald-road school, for the Rev. J. J. Burris. Messrs. F. R. Bates & Son, architects, 78, Bridge-street:—

*R. W. Moon, Ltd., Newport (Mon.).	

Northampton.—Cooling room adjoining the existing abattoir, for the T.C.:—

*Jordans, Ltd.	£578 10

Northampton.—Repairs and materials for the Eastern Command of the War Office. Commanding Royal Engineer, R.E. Office, Flagstaff-road, Colchester:—

*Chowns, Ltd., Northampton.	

Portsmouth.—Alterations at "The Osborne Arms," for Messrs. Eldridge, Pope & Co., Ltd. Messrs. A. E. Cogswell & Sons, chartered architects, Portsmouth:—

John Lay & Co., Portsmouth	£294
F. H. Jordan, Ltd., Southsea	289
L. Hoad, Southsea	276
A. E. Porter & Son, Portsmouth	243
F. J. Privett, Southsea	235

Portsmouth.—Rebuilding 166-8, Fratton-road, for Mr. A. Smart. Messrs. H. J. Dyer & Sons, architects and surveyors, 44, Victoria-road, N., Southsea:—

Saml. Salter, Southsea	£1,589
Howe & Bishop, Southsea	1,540
Tanner Bros., Southsea	1,507
F. Bevis, Ltd., Portsmouth	1,490
John Lay & Co., Portsmouth	1,418
F. J. Privett, Southsea	1,377

Prestwich.—Tiling of walls at County Mental Hospital, for the U.D.C.:—

*Conway & Co., Manchester.	

Prestwich.—For (1) pointing of brickwork on Clough estate, about 1,200 super yards; (2) pointing of brickwork on Rectory estate, about 1,000 super yards; and (3) construction of approximately 600 super yards of "in situ" concrete paths to houses on Clough estate, for the U.D.C.:—

*J. Brandwood, Burnley.	

Ringmer (Sussex).—Residence in Harrisons-lane:—

*Ringmer Building Works.	

Rotherham.—Conversion of the greenhouse at Oakwood Hall into a children's schoolroom, for the C.B.:—

*Coe & Lorriman, Rotherham	£158 11

Rotherham.—Public mortuary at Swallownest, for the R.D.C.:—

*W. Memmory, Swallownest	£522 16 2

Rotherham.—Twelve houses and roads at Laughton, for the R.D.C.:—

*Mollekin & Sons, Ltd., Maltby	£3,500

St. Helen's.—150 non-parlour houses on the Grange Park housing estate, for the Corporation. Mr. A. W. Bradley, Borough and Water Engineer:—

*W. Chappell & Sons, Sheffield.	

St. Ives.—Four houses, for the R.D.C.:—

Pettits, Ltd., Godmanchester	£2,000
A. N. Swearer & Son, Ramsey	1,730
W. Canham, Somersham	1,688
Allen & Son, Ltd., Brampton	1,560
*H. T. James, Bluntisham	1,330

Salford.—76 houses at Gerald-road, Pendleton, for the re-housing of dispossessed tenants from the Springfield-terrace unhealthy area, for the City Council:—

*W. H. Smith, Manchester £25,080

Sheffield.—22 parlour-type houses on the Dykes Hall estate, for the T.C. Mr. W. Geo. Davies, F.R.I.B.A., City Architect:—

*J. Laver & Sons, Ltd., Sheffield £9,908

Sheffield.—Installation of filtration, aeration, heating and circulating plant at the Park baths, for the T.C. Mr. W. Geo. Davies, F.R.I.B.A., City Architect:—

*Bell Bros., Manchester.

Shrewsbury.—Alterations to Allatt's school, Murivance, for the Corporation. Mr. A. W. Ward, Borough Surveyor:—

*Wm. Pace, Shrewsbury £365 10

Spenborough.—Conveniences and shelters in West End Park, Cleckheaton, for the Council. Mr. A. Rothera, surveyor:—

Mason—
*T. Drake, Cleckheaton.

Joiner—
*M. S. Nicholson, Cleckheaton.

Plumber—
*W. Waterhouse, Liversedge.

Tilers—
*S. Hepworth & Son, Cleckheaton.

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Twickenham.—Reinforced concrete bridge over the Crane at Meadway, for the T.C.:—

*G. Wimpey & Co. £4,196 13 4

Uxbridge.—Ward block of 68 beds, two-storied connecting corridors and the installation of an electric lift, at the Union Institution, at Hillingdon, near Uxbridge, for the B.G. Messrs. Saxon Snell & Phillips, FF.R.I.B.A., of 9, Bentinck-street, Manchester-square, W.1:—

Vigor & Co., Poplar, Ltd.	£19,878
E. D. Winn & Co., Ltd., Halkin-place	19,782
T. H. Kingerlee & Sons, Shepherd's Bush	19,293
Prestige & Co., London	19,115
Gee, Walker & Slater, Ltd., Derby	18,760
Welwyn Builders, Ltd.	18,722
J. & C. Bowyer, Ltd., Norwood	18,597
Universal Housing Co., Rickmansworth	18,498
G. H. Denne & Son, Deal	18,417
Building & Public Works Construction Co., Swindon	18,378
Wm. Moss & Sons, Cricklewood	18,287
Perrys (Ealing), Ltd.	18,242
G. Miskin & Sons, St. Albans	17,966
F. D. Hidden & Co., Brentford	17,950
A. Carter, Luton	17,700
H. Lacey & Sons, Luton	17,540
*A. E. A. Prowting, Ltd., Ruislip	17,490
G. H. Dibblin, Dartford	17,248

Warrington.—Repairs to the chimney of No. 1 Retort House, for the T.C.:

*W. J. Hewitt, Warrington.

Warrington.—Completion of the 9 houses in Manchester-road and Bibby-avenue, for the T.C.:—

*H. Heesom.

Wibsey.—Electricity transformer sub-station for the Bradford Corporation:—

*W. Garnett & Co.

Wokingham.—Converting an existing building into two wards, at the Institution, for the B.G. Mr. N. T. Salmon, A.R.I.B.A., architect:—

*Canning & Sargeant, Wokingham..... £484

York.—New factory for Messrs. Terry & Co.:—

*Higgs & Hill, Ltd., London.

York.—Re-roofing of the car shed at the tramway depot, for the Tramways Committee:—

*Mont Bridge Construction Co. £198

York.—Renovation of the existing tramway car shed at Fulford, for the Corporation. Mr. F. W. Spurr, City Engineer:—

*W. West, Ltd., York £674

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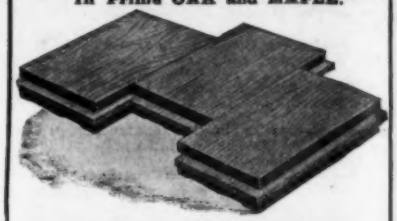
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